Maximizing the Lifespan of Open-Graded Friction Course on South Carolina Highways

A Certified Public Manager Research Project

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Problem Statement

Open-Graded Friction Course (OGFC) is an asphalt mix type that is primarily used on segments of interstate routes in South Carolina to enhance safety. The mix is designed to be permeable, allowing water to drain below the driving surface and then flow laterally beyond the travel lanes to be discharged on the shoulder of the roadway. By removing the water from the driving surface, OGFC reduces the overspray and splash and improves the friction values of the wet pavement, thereby reducing the risk of hydroplaning. Additionally, OGFC pavements have improved pavement marking visibility in wet conditions and can provide a quieter riding surface as compared to other asphalt and concrete riding surfaces.

OGFC has an intended service life of 10 years. However, localized failures have been observed on many of South Carolina's interstates within the first 3 – 5 years. The failures are usually less than 100' in length and are directly adjacent to OGFC that performs well for many years after the localized failure occurs. **Figures 1** and **2** show examples of these localized, premature failures.

Figure 1

Figure 2

All OGFC within a project has the same mix design requirements, is placed on underlying asphalt in similar condition, and is placed by the same contractor with similar equipment. The expectation of the South Carolina Department of Transportation (SCDOT) is for all the OGFC placed on a project to function as intended for the full service life before areas begin to fail. Accordingly, the first 10 years of these pavements should have little to no maintenance costs associated with them.

Across the state, as localized areas of OGFC fail prematurely, unsafe conditions of loose stone and uneven pavement are created. The SCDOT often receives complaints from the public related to cracked windshields, chipped paint, uneven pavement and overall concerns for safety as a result of these failed areas. Because of the unique mix design of OGFC and the associated traffic control required to place it, long-term repairs are costly. Though SCDOT crews can and have patched on the interstates, the production rates are extremely low as compared to contractor production rates and the SCDOT doesn't own the necessary equipment to effectively make the repairs.

Interstates with OGFC become eligible for additional funds at the end of their 10-year service life. As a result, SCDOT begins the process of procuring a contract to remove and replace the OGFC using federal funds designated for interstate maintenance and/or preservation in the 10^{th} year. Since the sections of roadway experiencing localized failures are still early in their service life, repair costs are not eligible for federal funding. Therefore, the extraordinary costs are either funded by local SCDOT operating budgets or not addressed at all. Consequently, it is imperative that the cause of these failures be determined and eliminated.

This research project is intended to solve a common issue with OGFC pavements and, in turn, help the SCDOT meet Goal 2 of its Strategic Plan, to "Maintain and preserve our existing transportation infrastructure". If OGFC pavements can perform well for the entirety of their intended 10-year service life, with no localized failures, costly repairs and premature replacement can be avoided. In turn, the task of utilizing taxpayer funds in an effective and efficient manner will be achieved and these segments of the interstate system will be safer and more reliable.

Data Collection

In order to identify potential causes of localized OGFC failures, it is necessary to build a database of all segments of interstates in South Carolina that have OGFC which was placed within the last 10 years. This database will include:

- Contract data (interstate, mile points)
- Current age of the pavement
- Type of OGFC mix used (hot mix, warm mix, ground tire rubber, etc.)
- Type of asphalt emulsion used as bonding layer between underlying asphalt and the OGFC
- Failure locations
- Field observations (type of failure)

Field observations will be categorized into three known failure types: Cold Joints, Bridge Joints, and Mid-Shift Raveling. Definitions of different types of asphalt joints and raveling locations can be found in **Appendix A**. Failure locations will be marked with GPS coordinates that can be referenced using Google Earth imagery and, using historical imagery, some of these failures will be studied to determine when the location began to show visual signs of failure.

If available, data will be obtained from projects that utilized GPS equipment. This data can be useful in associating current pavement failures with issues that may have arisen while paving the referenced location.

In an effort to quantify costs to the SCDOT associated with premature failures of OGFC, information will be compiled to show costs for local maintenance crews to make temporary repairs, costs to have contractors make permanent repairs and costs per lane mile for contractors to remove and replace OGFC on an entire segment of the interstate as part of a preservation contract.

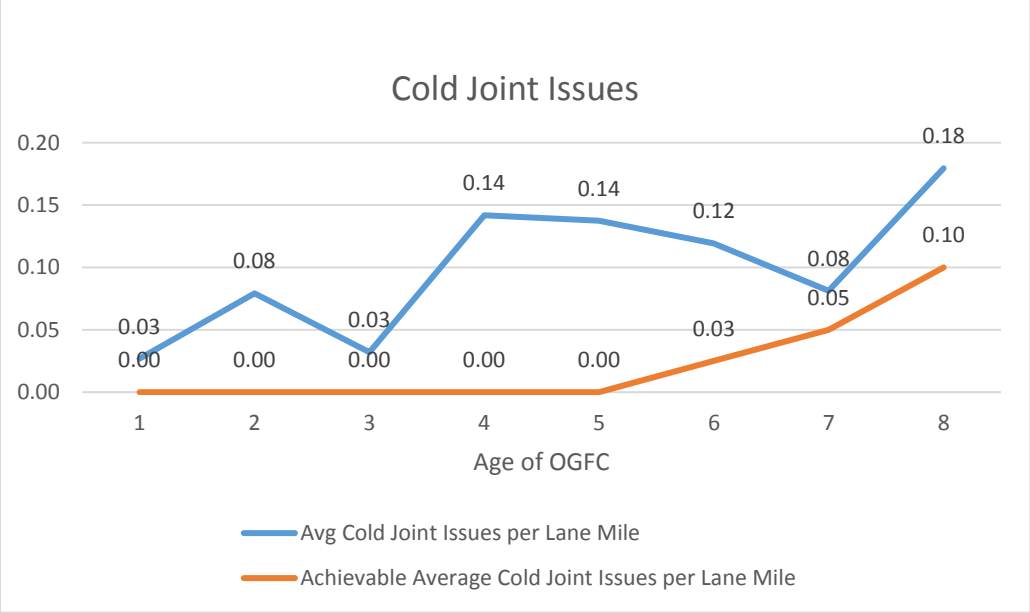
Data Analysis

After compiling the database of OGFC locations on the interstate system and documenting field observations at each failure location, the quantity and frequency of failures can be evaluated statewide.

Key Findings

The follow are eight key findings, each with potential causes and possible solutions.

1. The number of Cold Joint Issues can and needs to be reduced. The collection of data in **Appendix B** shows the existing Average Cold Joint Issues per Lane Mile as it relates to the age of the OGFC. **Graph 1** shows the existing Average Cold Joint Issues per Lane Mile and an Achievable Average Cold Joint Issues per Lane Mile, both relative to age. This achievable average was derived from data collected on projects with lower numbers of cold joint issues per lane mile. If low numbers were achieved on some projects, they should be achievable on all projects.



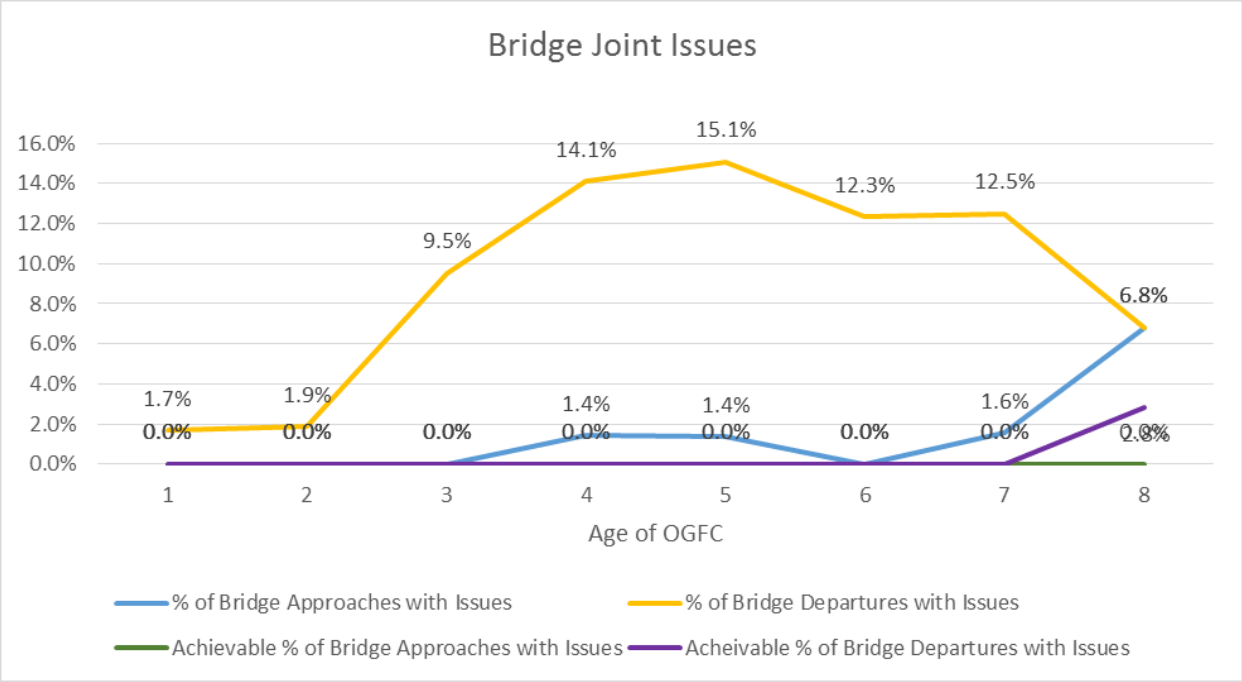
Graph 1

One potential cause for these cold joint issues could be a result of either the OGFC being cooler than specified when it gets to the screed or the screed not being hot enough to slide across the surface of the OGFC. This would cause the asphalt to stretch or tear and ultimately result in stone loss over time. Another potential cause could be chemical contamination of the OGFC. At the end of each shift, contractors must properly clean the

paver out to reduce the buildup of emulsion on parts. Only approved asphalt release agents are authorized to be used. Contractors are tempted to use unauthorized chemicals such as diesel fuel since it is readily available in the portable fuel tanks as opposed to obtaining an approved release agent at the asphalt plant. Unapproved chemicals such as diesel fuel are prohibited because they degrade the emulsion and reduce the bonding capacity of the asphalt mix. An asphalt paver that has been cleaned with unapproved chemicals would contaminate the first load of asphalt placed at the cold joint and could lead to raveling over time.

A potential solution to reduce raveling at cold joints is to pass one truckload of OGFC though the paver to preheat the hopper, conveyor, augers and screed prior to paving. In addition to preheating the paver, it would reduce temperature loss of OGFC as it passes through the paver and remove any unapproved chemicals from the paver components.

2. The number of Bridge Departure Joint Issues far outweighed the number of Bridge Approach Joint Issues throughout all ages of OGFC. These departure issues can and need to be reduced. The collection of data shown in **Appendix B** shows both the existing numbers of Bridge Joint Issues, separated by Approach and Departure joints as they relate to the age of the OGFC. **Graph 2** shows the percentage of bridge joint issues. The achievable percentage was derived from data collected on projects with a lower number of respective bridge joint issues per bridge joint. If low numbers were achieved on some projects, they should be achievable on all projects.



Graph 2

Three possible causes for a higher percentage of bridge departure issues were identified. First, bridge approaches being paved at the end of a shift when the asphalt, paver, and rollers are hot as compared to bridge departures being paved at the beginning of a shift (cold joint) when the asphalt, paver, and rollers are cooler than necessary.

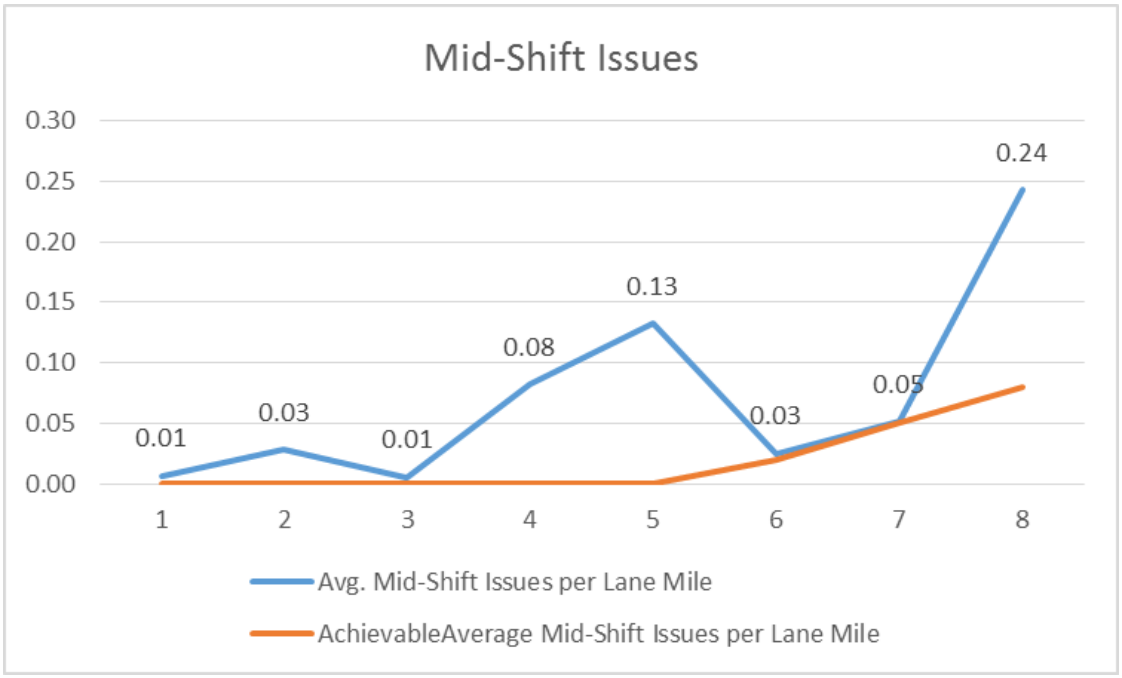
Second, if bridge departures are paved during the middle of a shift, the potential remains for the asphalt and paving equipment to cool to a less than desirable temperature. It is estimated that it takes 20-30 minutes from the time the paver picks up the screed from the approach end until the time that all handwork is complete at the departure joint and mainline paving resumes. Once the paver picks up the screed on the approach, workers perform the necessary handwork to ensure the joint has a smooth transition onto the bridge. During this time, the paver is parked at the approach end so workers can shovel

additional OGFC from the hopper to fill in low areas. After all handwork is complete, the paver and workers cross the bridge to the departure end while the rollers compact the OGFC on the approach end. During this time, the OGFC in the hopper of the paver and the paver's screed is cooling. Once the paver is across the bridge, preparations to resume paving on the departure joint begin. Similar to the approach joint, the departure end requires handwork to ensure the transition from the bridge is smooth. The cooling mix from the hopper is spread across the lane and the workers shovel additional OGFC from the hopper to fill in low areas. After the handwork is complete, mainline paving resumes and the rollers compact the departure joint.

Third, if the OGFC on the departure end is paved to a grade higher than the bridge deck, snow removal equipment could damage the surface of the OGFC. Once the surface is damaged, the daily traffic volumes would continue to deteriorate the pavement, resulting in large raveled areas at bridge departure locations.

Three potential solutions to reduce raveling at bridge departure joints were also identified. First, if the departure end of the bridge is to be used as the starting location for a work shift, utilize one truckload of OGFC to preheat the paver prior to paving. Second, if both the approach and departure ends are to be paved in the same shift, empty the paver hopper and conveyor after paving the approach end and utilize fresh mix from the truck when beginning to pave the departure end. Third, ensure that all bridge joints provide a smooth transition onto and off of bridge decks. The use of a 10 foot straight edge could be used to ensure the asphalt is placed at the same grade as the bridge deck.

3. The number of Mid-Shift Issues can and needs to be reduced. The collection of data shown in **Appendix B** shows both the existing Average Mid-Shift Issues per Lane Mile as it relates to the age of the OGFC. **Graph 3** shows the existing Average Mid-Shift Issues per Lane Mile and an Achievable Average Mid-Shift Issues per Lane Mile, both relative to age. This achievable average was derived from data collected on projects with lower numbers of mid-shift issues per lane mile. If low numbers were achieved on some projects, they should be achievable on all projects.



Graph 3

Reasons for individual mid-shift issues are unknown and could vary greatly. Possible reasons for raveling during a shift include, but are limited to:

- A truck bed contaminated with an unapproved chemical such as diesel fuel
- A truck bed contaminated with an excessive amount of an approved release agent
- Excessive paver stop that allowed the asphalt in the paver to cool before being placed and compacted.
- Chemical contamination of paving equipment while paving, such as fuel on rollers
- An excessively hot load of asphalt batched from the plant
- An excessively cold load of asphalt due to a trucking delay or temperature variation at the asphalt plant
- A delay in rolling the OGFC, such as an equipment failure with a roller
- A chemical spill on the pavement after paving was completed

There are several potential solutions to reduce mid-shift raveling on OGFC. The SCDOT can inspect all trucks before they are loaded with OGFC to ensure the beds are not contaminated in any way and that the amount of release agent is appropriate. Also, the SCDOT should strengthen specifications to reduce the allowable durations of paver stops. The current specification allows up to two 30-minute paver stops in one shift but does not regulate the number of paver stops equal to or less than 29 minutes. The SCDOT must regularly check to ensure contractor employees are only utilizing approved release agents on rollers, hand tools, boots, etc. In addition, the SCDOT must check the temperature of each load of asphalt delivered to ensure temperature specifications are met. If there is an equipment issue with a roller, the paver should be stopped until the process can

properly resume. The SCDOT should require the contractor to remove and replace any OGFC in an area of a paver stop exceeding a specified duration.

4. It was determined that the various issues were not linear with age. Both the data and graphs in **Appendix B** indicate that there were various issues that occurred in newer sections of OGFC with higher frequencies of premature failures as compared to sections that were much older. **It should be noted that I-26 EB from MP 0.00 to MP 5.00 was completed in 2012 and has no issues in February 2019!** This section was long enough to have multiple paving shifts in each lane which increased the opportunity for cold joints. Further research would be warranted to determine the mix type, tack type, month(s) the OGFC was placed, etc. to use as a guideline for future projects. This section of interstate is subject to as much winter weather and snow removal as any other section of interstate in South Carolina.

5. An attempt was made to correlate documented issues with OGFC to GPS data that was collected on projects but was unsuccessful. There were only three projects in the state that utilized GPS data on the asphalt paver but the GPS data was inconclusive.

6. Once OGFC begins to ravel, the rate of deterioration increases and can quickly result in failed areas that pose safety issues. **Appendix C** shows a representative sample of different types of premature failures. Historical imagery from Google Earth show approximate dates of when segments were paved, dates when issues were first noted and dates when the pavement had failed completely.

7. Costs were computed for placing asphalt in a 100’ x 12’ area, representing an interstate travel lane at a length of 100’ for comparison purposes. Various cost comparisons can be found in **Appendix D**. It costs an average of $1,691 for a contractor to pave this area on a large interstate preservation contract. It costs SCDOT Maintenance forces $1,768 to patch the same area, however, production rates are extremely low and any costs associated with repairing premature failures of OGFC are more than the SCDOT should spend.

   If the SCDOT paid a Contractor to remove and replace various areas throughout a long segment of interstate, the costs were $4,973. For a comparison, the SCDOT asked a contractor to quote the removal and replacement of a single location, one using OGFC mix and the other using a conventional dense-graded mix. The OGFC option cost $28,007 and dense graded mix option costs $15,172 for the same 100’ x 12’ area.

8. Type of OGFC mixes and types of asphalt emulsions used as a bonding layer were not able to be collected. Specifications allow for various mix types to be utilized under a single pay item for OGFC, therefore the actual mix types cannot be queried from software. Similarly, asphalt emulsions used as bonding layers are incidental to the unit prices of OGFC so emulsion types cannot be queried either.

Implementation Plan

In an effort to reduce the three observed OGFC failure types, several solutions are being proposed. These can be summarized in five distinct categories.

1. The contractor should pass a minimum of a half of a truck load of asphalt through the paver to both preheat the paver and remove any contaminants. It should be noted that the newly revised SCDOT specification for OGFC became effective on January 1, 2019 and requires this. Prior to 2019, this was not required.
2. When paving bridge departure ends, empty the paver of any cooling asphalt and utilize hot asphalt to ensure quality. In addition, the SCDOT inspector should utilize a 10 foot straight edge to ensure a smooth transition from the bridge deck.
3. At the asphalt plant, an SCDOT inspector should inspect all truck beds for contaminants as well as check the temperatures of all asphalt before it leaves. Once the truck arrives at the paver, the asphalt temperature should again be checked to ensure it meets specifications.
4. The SCDOT should reduce the allowable duration of paver stops and require any location of excessive paver stops to be removed and replaced.
5. The SCDOT should monitor and continue to prohibit use of unapproved release agents.

This research project will be presented to both the Deputy Director for Engineering and the State Pavement Design Engineer. A strong recommendation will be made to tighten the OGFC specifications in an effort to reduce the observed issues. There are several items in this Implementation Plan that have costs associated. When crossing a bridge deck to pave the

departure end, the contractor would have to dispose of any unused OGFC remaining in the paver. It is estimated that this amount of mix could cost as much as $600 as well as the labor costs associated with loading the asphalt and disposing of it at the asphalt plant. The 10 foot straight edges are considered to be a tool-of-the-trade but can be purchased for approximately $120 and can be used for many years. This recommendation would likely require an additional SCDOT inspector to be utilized at the asphalt plant. The hourly cost would vary based on the loaded labor rate of the employee. These costs are minimal as compared to the owner and user costs associated with failing OGFC throughout the state.

One obstacle identified would relate to the specification change regarding the duration of paver stops. The SCDOT presents any proposed specification changes to the South Carolina Association of General Contractors (AGC). The AGC will solicit comments from various paving contractors in South Carolina. Historically, proposed specification changes are debated, however, this should not be a deterrent. Communication should begin with both the AGC and the South Carolina Asphalt Paving Association. Once a specification change is approved, the SCDOT could integrate the change and begin training inspectors on the changes. In the meantime, the SCDOT could distribute these key findings and proposed solutions to inspectors and paving contractors and propose changes based on Best Management Practices.

Evaluation Method

Once the Implementation Plan is in place, the SCDOT should wait five years then recollect data on OGFC as collected in this report. Data would only need to be obtained from projects paved under the new specification. The new data could be compared to the data for years 1-5 of this report, located in **Appendix B**.

Summary and Recommendations

This research project shows that there are many OGFC projects that show high numbers of premature failures in common areas within the first 5 years of completion. These failures do not meet the expectation of the SCDOT or the traveling public. Research efforts and specification changes need to continue to maximize the lifespan of OGFC on South Carolina's highways.

Appendix A

Definitions of Different Types of Asphalt Joints and Raveling Locations

1. **Cold Joints** – A cold joint is an industry term for a transverse joint installed by the contractor at the end of a work shift. This joint is squared off at the end of a paving shift and provides a clean, uniform starting point for the paving equipment when beginning the next shift of paving. Each travel lane will have cold joints over the length of the project segment since there is a limit to the distance that can be paved in a single shift. Failures at cold joints are easily identified because the raveling will begin at a uniform, transverse joint and proceed in the direction of travel in an irregular shape. At the beginning of a shift, not only is the joint cold but the paving equipment (material transfer device, paver hopper, paver conveyor, possibly the screed, and rollers) may be cold as well.

Good Cold Joints in Both Lanes – I-77 NB at Mile Point 76
These joints were paved in 2014

Bad Cold Joint – I-77 SB at Mile Point 69.80
This joint was paved in 2013

Bad Cold Joint – I-77 SB at Mile Point 69.10
This joint was paved in 2013

2. **Bridge Joints** – Each bridge has two joints per travel lane; one at the approach end and one at the departure end. All bridges have concrete decks and with the exception of a few that have since been overlaid with asphalt. The asphalt pavement terminates at the approach end and resumes at the departure end. Though a bridge only has two ends, the potential for a bridge joint failure is multiplied by the number of travel lanes. It is important to note that many bridge departure ends could fall into the Cold Joint category since bridges are logical locations to end a shift. Contractors will often calculate the required tonnage to stop a shift of work at a bridge approach and start the next shift at a bridge departure. By doing this, it reduces the number of cold joints in a segment.

Good Bridge Approach Joints – I-77 NB at Mile Point 67.20
These joints were paved in 2013

Good Bridge Departure Joints – I-77 NB at Mile Point 64.54
These joints were paved in 2013

Bad Bridge Departure Joint – I-85 SB at Mile Point 48.52
This joint was paved in 2013

3. **Mid-Shift Location** – There is a limit to the amount of asphalt can be placed in one shift. This can vary based on lane closure restrictions, asphalt plant production rates, and the number of trucks available to deliver asphalt from the plant to the paver. While the beginning and ending of a shift are cold joints, there are issues in between these locations. The areas between the beginning of a shift and the end of a shift are referred to in this document as mid-shift locations. Failures located at mid-shift locations are easily identified because the raveling will begin and end in an irregular shape.

Mid-Shift Raveling – I-77 SB at Mile Point 69.0

Mid-Shift Raveling – I-26 EB at Mile Point 206.8

Appendix B

Tables and Graphs of Collected Data

DATA SUMMARY SHEET (SORTED BY ROUTE)

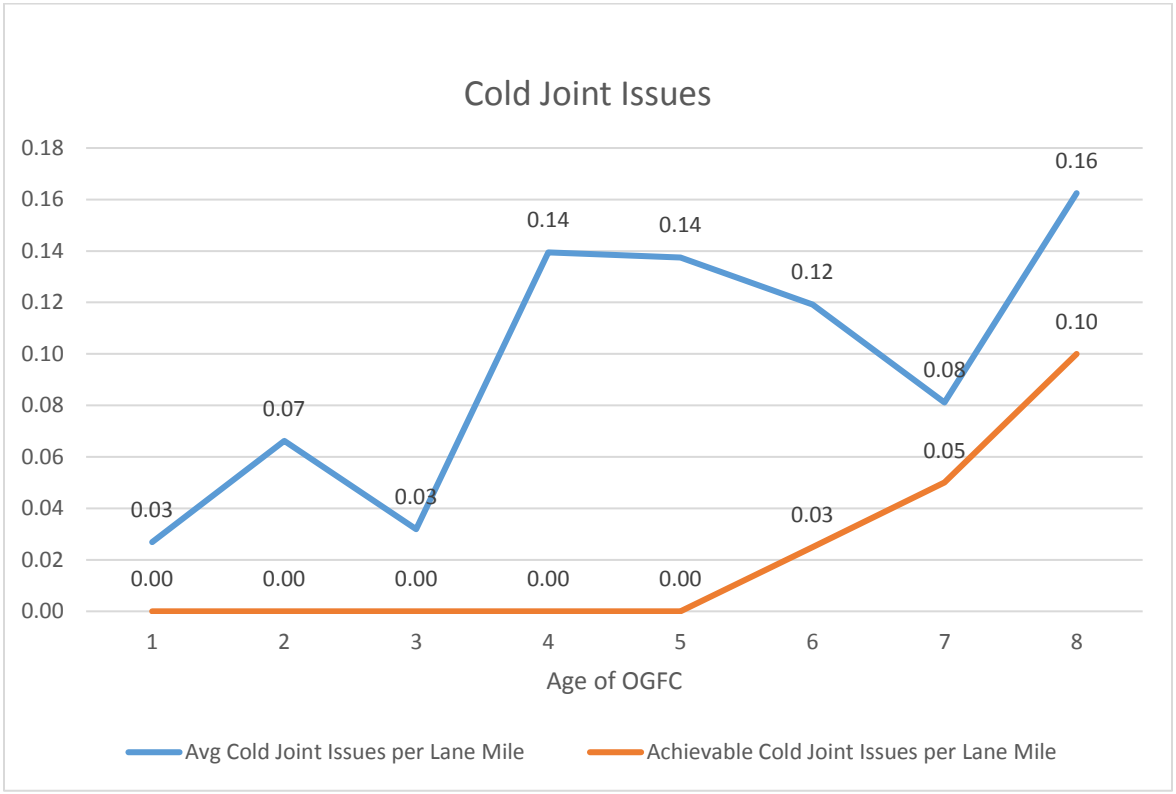
Road	Dir.	Begin MP	End MP	No. of Lanes	File No.	Contractor	Completion Month/Yr	Lane Miles	Total Cold Joint Issues	Cold Joint Issues/Mile	# of Bridges in Section	Bridge Approach Issues	Total Bridge Approaches	Bridge Departure Issues	Total Bridge Departures	Total Bridge Joint Issues	Total Bridge Joints	Total Bridge Joint Issues per Bridge Joint	Total Mid-Shift Issues	Mid-Shift Issues/Mile	Total Cold Joint and Mid-Shift Issues per Lane-Mile
I-20	W	6.50	13.00	2	02.040654	Reeves	7/2012	13.00	5	0.38	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.19
I-20	W	13.00	22.74	2	0280860	Satterfield	12/2014	19.48	2	0.10	3.00	0	6	2	6	2	12	0.17	0	0.00	0.21
I-20	E	22.70	37.70	2	02..37242A	REA	2/2012	30.00	1	0.03	3.00	0	6	1	6	1	12	0.08	0	0.00	0.07
I-20	W	37.70	54.40	2	32.037179A	CR Jackson	5/2012	33.40	6	0.18	4.00	0	8	0	8	0	16	0.00	0	0.00	0.18
I-20	E&W	60.28	69.90	4	3240.037174A	CR Jackson	5/2012	38.48	2	0.05	10.00	0	20	4	20	4	40	0.10	0	0.00	0.16
I-20	E&W	69.90	76.10	4	4090840	CR Jackson	4/2017	24.80	0	0.00	6.00	0	12	0	12	0	24	0.00	0	0.00	0.00
I-20	E&W	84.55	94.50	4	28.040658	Sloan	9/2012	39.80	7	0.18	4.00	0	8	1	8	1	16	0.06	5	0.13	0.33
I-20	E&W	94.50	105.80	4	28.039535	Boggs	5/2016	45.20	5	0.11	14.00	0	28	1	28	1	56	0.02	1	0.02	0.15
I-20	W	133.80	139.15	2	Unknown	Unknown	?/2016	10.70	0	0.00	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.00
I-20	E	135.40	139.15	2	Unknown	Unknown	?/2016	7.50	0	0.00	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.00
I-26	E	0.00	5.00	2	42.037126A	Sloan	8/2012	10.00	0	0.00	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.00
I-26	W	5.10	13.80	2	42.039719	Sloan	12/2012	17.40	1	0.06	1.00	0	2	0	2	0	4	0.00	0	0.00	0.06
I-26	E	5.00	11.10	2	43.038400	Sloan	5/2011	12.20	1	0.08	1.00	0	2	1	2	1	4	0.25	0	0.00	0.16
I-26	E	11.10	22.00	2	42.038624A	Sloan	1/2013	21.80	4	0.18	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.18
I-26	E&W	43.80	60.30	4	30.038567	Sloan	4/2015	66.00	2	0.03	4.00	0	8	1	8	1	16	0.06	0	0.00	0.05
I-26	E&W	85.16	85.75	4	Unknown	Unknown	11/2012	2.36	2	0.85	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.85
I-26	W	98.01	99.25	2	Unknown	Unknown	11/2011	2.48	1	0.40	0.00	0	0	0	0	0	0	#DIV/0!	1	0.40	0.81
I-26	E&W	107.90	109.72	7	32.038831	CR Jackson	10/2014	12.74	2	0.16	2.00	0	7	1	7	1	14	0.07	1	0.08	0.31
I-26	E&W	109.72	114.88	7	32.038831	CR Jackson	10/2014	36.12	1	0.03	8.00	1	28	1	28	2	56	0.04	2	0.06	0.14
I-26	E&W	114.88	125.70	6	0932.038170	Ander/Cola	11/2016	64.92	1	0.02	2.00	0	6	0	6	0	12	0.00	1	0.02	0.03
I-26	E&W	125.70	136.00	4	0932.038170	Ander/Cola	11/2016	41.20	2	0.05	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.05
I-26	E&W	136.00	149.10	4	09.040661	CR Jackson	10/2014	52.40	10	0.19	0.00	0	0	1	0	1	0	#DIV/0!	12	0.23	0.44
I-26	E&W	181.70	197.67	4	08.040656	Banks	11/2012	63.88	8	0.13	4.00	0	8	2	8	2	16	0.13	3	0.05	0.20
I-26	E&W	197.67	198.28	6	08.040656	Banks	11/2012	3.66	0	0.00	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.00
I-26	E&W	198.28	204.00	6	08.038314	Banks	10/2010	34.32	3	0.09	0.00	0	0	0	0	0	0	#DIV/0!	3	0.09	0.17
I-26	E&W	204.00	208.54	6	08.038314	Banks	10/2010	27.24	5	0.18	0.00	0	0	0	0	0	0	#DIV/0!	7	0.26	0.44
I-26	E&W	208.54	209.80	8	08.038314	Banks	10/2010	10.08	1	0.10	2.00	0	8	1	8	1	16	0.06	7	0.69	0.89
I-77	N&S	27.00	33.56	4	8888400	Lane	11/2015	26.24	1	0.04	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.04
I-77	N&S	48.18	64.70	4	1220.039419	Boggs	6/2013	66.08	7	0.11	8.00	0	16	1	16	1	32	0.03	1	0.02	0.12
I-77	N&S	64.70	76.00	4	12.042242	Lane	9/2016	45.20	9	0.20	10.00	0	20	0	20	0	40	0.00	4	0.09	0.29
I-77	N&S	76.00	91.50	8	4680840	Lane	3/2017	124.00	4	0.03	12.00	0	48	1	48	1	96	0.01	1	0.01	0.04
I-85	N&S	0.00	10.80	4	04.040655	Sloan	10/2014	43.20	1	0.02	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.02
I-85	N&S	10.80	18.80	4	04.036559A	Sloan	1/2011	32.00	4	0.13	0.00	1	0	1	0	2	0	#DIV/0!	1	0.03	0.16
I-85	N&S	34.00	43.00	6	0423.037173A	Sloan	5/2012	54.00	7	0.13	6.00	0	18	1	18	1	36	0.03	0	0.00	0.13
I-85	S	43.00	47.30	3	23.038622	Sloan	3/2012	12.90	0	0.00	1.00	0	3	0	3	0	6	0.00	0	0.00	0.00
I-85	N	43.00	47.30	3	2342.039847	REA	8/2013	12.90	1	0.08	2.00	0	6	0	6	0	12	0.00	2	0.16	0.23
I-85	S	47.30	56.10	3	2342.039847	REA	8/2013	26.40	6	0.23	1.00	0	3	2	3	2	6	0.33	3	0.11	0.34
I-85	N&S	88.00	106.00	4	11.041486R1	Sloan	11/2015	72.00	3	0.04	8.00	0	16	3	16	3	32	0.09	1	0.01	0.06
I-95	N&S	0.00	4.00	4	27.041488	RB Baker	11/2013	16.00	1	0.06	10.00	0	20	3	20	3	40	0.08	1	0.06	0.13
I-95	N&S	85.70	99.40	4	38.039031	CR Jackson	7/2014	54.80	15	0.27	15.00	0	30	5	30	5	60	0.08	3	0.05	0.33
I-95	N	114.14	131.48	2	14.037231A	CR Jackson	2/2013	34.68	3	0.09	1.00	0	2	1	2	1	4	0.25	7	0.20	0.29
I-95	S	114.20	119.40	2	14.038645	Palmetto	2/2013	10.40	4	0.38	1.00	0	2	1	2	1	4	0.25	10	0.96	1.35
I-95	N&S	171.20	193.40	4	1721.037175A	Costello	1/2011	88.80	5	0.06	31.00	0	62	6	62	6	124	0.05	5	0.06	0.11
I-520	E&W	5.87	11.74	4	0290470	Satterfield	11/2015	23.48	0	0.00	9.00	0	18	0	18	0	36	0.00	0	0.00	0.00
I-526	E&W	10.12	15.89	4	08.038314	Banks	10/2010	23.08	8	0.35	18.00	3	36	2	36	5	72	0.07	6	0.26	0.61
I-526	E&W	17.51	19.56	4	10.039363A	Banks	12/2013	8.20	1	0.12	12.00	1	24	3	24	4	48	0.08	2	0.24	0.37

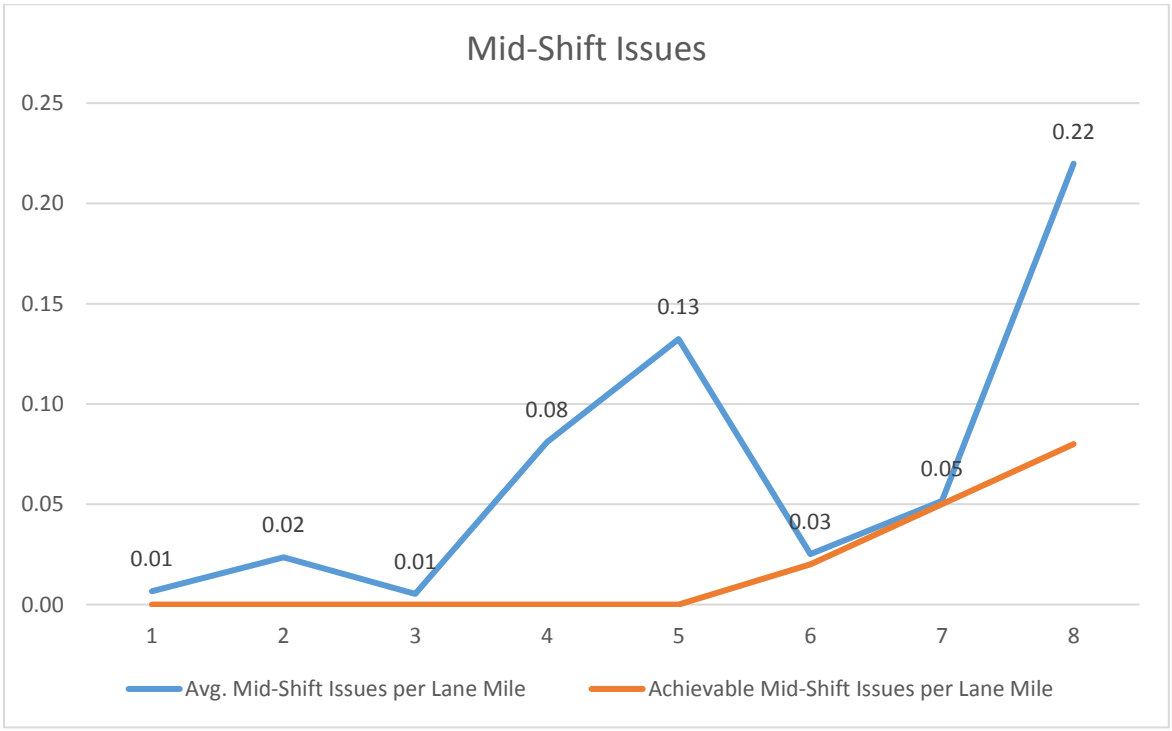
DATA SUMMARY SHEET (SORTED BY DATE)

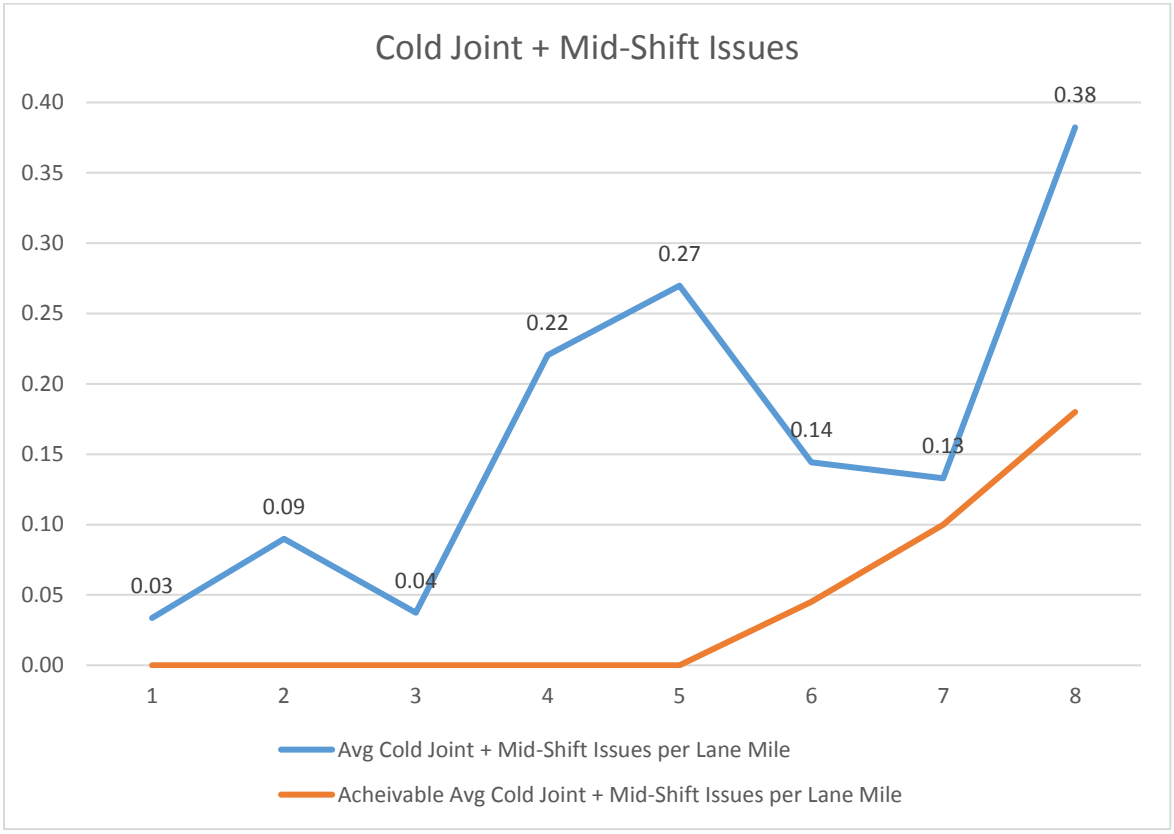
Road	Dir.	Begin MP	End MP	No. of Lanes	File No.	Contractor	Completion Month/Yr	Lane Miles	Total Cold Joint Issues	Cold Joint Issues/Mile	# of Bridges in Section	Bridge Approach Issues	Total Bridge Approaches	Bridge Departure Issues	Total Bridge Departures	Total Bridge Joint Issues	Total Bridge Joints	Total Bridge Joint Issues per Bridge Joint	Total Mid-Shift Issues	Mid-Shift Issues/Mile	Total Cold Joint and Mid-Shift Issues per Lane-Mile
I-26	E&W	198.28	204.00	6	08.038314	Banks	10/2010	34.32	3	0.09	0.00	0	0	0	0	0	0	#DIV/0!	3	0.09	0.17
I-26	E&W	204.00	208.54	6	08.038314	Banks	10/2010	27.24	5	0.18	0.00	0	0	0	0	0	0	#DIV/0!	7	0.26	0.44
I-26	E&W	208.54	209.80	8	08.038314	Banks	10/2010	10.08	1	0.10	2.00	0	8	1	8	1	16	0.06	7	0.69	0.79
I-526	E&W	10.12	15.89	4	08.038314	Banks	10/2010	23.08	8	0.35	18.00	3	36	2	36	5	72	0.07	6	0.26	0.61
I-85	N&S	10.80	18.80	4	04.036559A	Sloan	1/2011	32.00	4	0.13	0.00	1	0	1	0	2	0	#DIV/0!	1	0.03	0.16
I-95	N&S	171.20	193.40	4	1721.037175A	Costello	1/2011	88.80	5	0.06	31.00	0	62	6	62	6	124	0.05	5	0.06	0.11
I-26	E	5.00	11.10	2	43.038400	Sloan	5/2011	12.20	1	0.08	1.00	0	2	1	2	1	4	0.25	0	0.00	0.08
I-26	W	98.01	99.25	2	Unknown	Unknown	11/2011	2.48	1	0.40	0.00	0	0	0	0	0	0	#DIV/0!	1	0.40	0.81
I-20	E	22.70	37.70	2	02..37242A	REA	2/2012	30.00	1	0.03	3.00	0	6	1	6	1	12	0.08	0	0.00	0.03
I-85	S	43.00	47.30	3	23.038622	Sloan	3/2012	12.90	0	0.00	1.00	0	3	0	3	0	6	0.00	0	0.00	0.00
I-20	W	37.70	54.40	2	32.037179A	CR Jackson	5/2012	33.40	6	0.18	4.00	0	8	0	8	0	16	0.00	0	0.00	0.18
I-20	E&W	60.28	69.90	4	3240.037174A	CR Jackson	5/2012	38.48	2	0.05	10.00	0	20	4	20	4	40	0.10	0	0.00	0.05
I-85	N&S	34.00	43.00	6	0423.037173A	Sloan	5/2012	54.00	7	0.13	6.00	0	18	1	18	1	36	0.03	0	0.00	0.13
I-20	W	6.50	13.00	2	02.040654	Reeves	7/2012	13.00	5	0.38	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.38
I-26	E	0.00	5.00	2	42.037126A	Sloan	8/2012	10.00	0	0.00	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.00
I-20	E&W	84.55	94.50	4	28.040658	Sloan	9/2012	39.80	7	0.18	4.00	0	8	1	8	1	16	0.06	5	0.13	0.30
I-26	E&W	85.16	85.75	4	Unknown	Unknown	11/2012	2.36	2	0.85	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.85
I-26	E&W	181.70	197.67	4	08.040656	Banks	11/2012	63.88	8	0.13	4.00	0	8	2	8	2	16	0.13	3	0.05	0.17
I-26	E&W	197.67	198.28	6	08.040656	Banks	11/2012	3.66	0	0.00	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.00
I-26	W	5.10	13.80	2	42.039719	Sloan	12/2012	17.40	1	0.06	1.00	0	2	0	2	0	4	0.00	0	0.00	0.06
I-26	E	11.10	22.00	2	42.038624A	Sloan	1/2013	21.80	4	0.18	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.18
I-95	N	114.14	131.48	2	14.037231A	CR Jackson	2/2013	34.68	3	0.09	1.00	0	2	1	2	1	4	0.25	7	0.20	0.29
I-95	S	114.20	119.40	2	14.038645	Palmetto	2/2013	10.40	4	0.38	1.00	0	2	1	2	1	4	0.25	10	0.96	1.35
I-77	N&S	48.18	64.70	4	1220.039419	Boggs	6/2013	66.08	7	0.11	8.00	0	16	1	16	1	32	0.03	1	0.02	0.12
I-85	N	43.00	47.30	3	2342.039847	REA	8/2013	12.90	1	0.08	2.00	0	6	0	6	0	12	0.00	2	0.16	0.23
I-85	S	47.30	56.10	3	2342.039847	REA	8/2013	26.40	6	0.23	1.00	0	3	2	3	2	6	0.33	3	0.11	0.34
I-95	N&S	0.00	4.00	4	27.041488	RB Baker	11/2013	16.00	1	0.06	10.00	0	20	3	20	3	40	0.08	1	0.06	0.13
I-526	E&W	17.51	19.56	4	10.039363A	Banks	12/2013	8.20	1	0.12	12.00	1	24	3	24	4	48	0.08	2	0.24	0.37
I-95	N&S	85.70	99.40	4	38.039031	CR Jackson	7/2014	54.80	15	0.27	15.00	0	30	5	30	5	60	0.08	3	0.05	0.33
I-26	E&W	136.00	149.10	4	09.040661	CR Jackson	10/2014	52.40	10	0.19	0.00	0	0	1	0	1	0	#DIV/0!	12	0.23	0.42
I-85	N&S	0.00	10.80	4	04.040655	Sloan	10/2014	43.20	1	0.02	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.02
I-20	W	13.00	22.74	2	0280860	Satterfield	12/2014	19.48	2	0.10	3.00	0	6	2	6	2	12	0.17	0	0.00	0.10
I-26	E&W	107.90	109.72	7	32.038831	CR Jackson	10/2014	12.74	2	0.16	2.00	0	7	1	7	1	14	0.07	1	0.08	0.24
I-26	E&W	109.72	114.88	7	32.038831	CR Jackson	10/2014	36.12	1	0.03	8.00	1	28	1	28	2	56	0.04	2	0.06	0.08
I-26	E&W	43.80	60.30	4	30.038567	Sloan	4/2015	66.00	2	0.03	4.00	0	8	1	8	1	16	0.06	0	0.00	0.03
I-77	N&S	27.00	33.56	4	8888400	Lane	11/2015	26.24	1	0.04	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.04
I-85	N&S	88.00	106.00	4	11.041486R1	Sloan	11/2015	72.00	3	0.04	8.00	0	16	3	16	3	32	0.09	1	0.01	0.06
I-520	E&W	5.87	11.74	4	0290470	Satterfield	11/2015	23.48	0	0.00	9.00	0	18	0	18	0	36	0.00	0	0.00	0.00
I-20	E&W	94.50	105.80	4	28.039535	Boggs	5/2016	45.20	5	0.11	14.00	0	28	1	28	1	56	0.02	1	0.02	0.13
I-77	N&S	64.70	76.00	4	12.042242	Lane	9/2016	45.20	9	0.20	10.00	0	20	0	20	0	40	0.00	4	0.09	0.29
I-26	E&W	114.88	125.70	6	0932.038170	Ander/Cola	11/2016	64.92	1	0.02	2.00	0	6	0	6	0	12	0.00	1	0.02	0.03
I-26	E&W	125.70	136.00	4	0932.038170	Ander/Cola	11/2016	41.20	2	0.05	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.05
I-20	W	133.80	139.15	2	Unknown	Unknown	2016??	10.70	0	0.00	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.00
I-20	E	135.40	139.15	2	Unknown	Unknown	2016??	7.50	0	0.00	0.00	0	0	0	0	0	0	#DIV/0!	0	0.00	0.00
I-77	N&S	76.00	91.50	8	4680840	Lane	3/2017	124.00	4	0.03	12.00	0	48	1	48	1	96	0.01	1	0.01	0.04
I-20	E&W	69.90	76.10	4	4090840	CR Jackson	4/2017	24.80	0	0.00	6.00	0	12	0	12	0	24	0.00	0	0.00	0.00

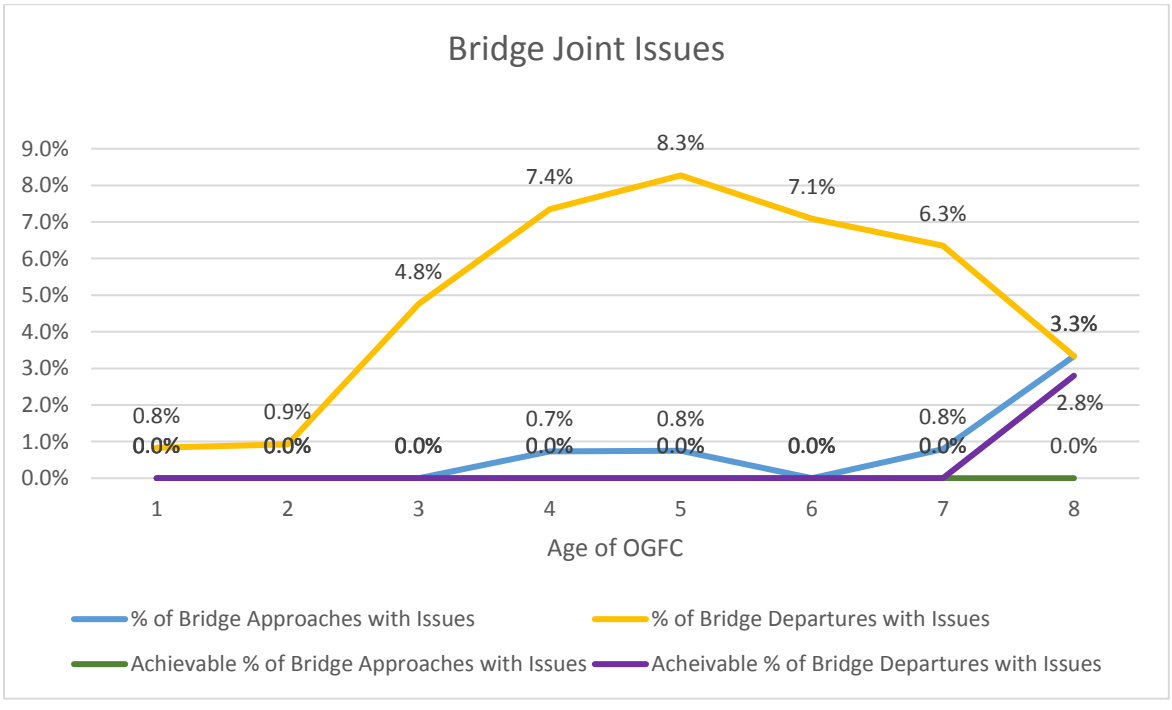
Age Summary

	Age	Total OGFC Lane Miles	Total Cold Joint Issues	Avgerage Cold Joint Issues/Lane Mile	Achievable Cold Joint Issues/Lane Mile	Total Bridges in OGFC	Bridge Approach Issues	Total Bridge Approaches	% of Bridge Approaches w/ Issues	Achievable % of Bridge Approaches with Issues	Bridge Departure Issues	Total Bridge Departures	% of Bridge Departures w/ Issues	Achievable % of Bridge Departures with Issues	Total Bridge Joint Issues	Total Bridge Joints	% of Combined Bridge Joints w/ Issues	Total Mid-Shift Issues	Average Mid-Shift Issues/Lane Mile	Achievable Average of Mid-Shift Issues/Lane Mile	Average Cold Joint and Mid-Shift Issues per Lane-Mile	Achievable Average Cold Joint and Mid-Shift Issues/Lane Mile
2017	1	148.80	4.00	0.03	0.00	18.00	0.00	60.00	0.0%	0.0%	1.00	60.00	1.7%	0.0%	1.00	120.00	0.01	1.00	0.01	0.00	0.03	0.00
2016	2	214.72	17.00	0.08	0.00	26.00	0.00	54.00	0.0%	0.0%	1.00	54.00	1.9%	0.0%	1.00	108.00	0.01	6.00	0.03	0.00	0.11	0.00
2015	3	187.72	6.00	0.03	0.00	21.00	0.00	42.00	0.0%	0.0%	4.00	42.00	9.5%	0.0%	4.00	84.00	0.05	1.00	0.01	0.00	0.04	0.00
2014	4	218.74	31.00	0.14	0.00	28.00	1.00	71.00	1.4%	0.0%	10.00	71.00	14.1%	0.0%	11.00	142.00	0.08	18.00	0.08	0.00	0.22	0.00
2013	5	196.46	27.00	0.14	0.00	35.00	1.00	73.00	1.4%	0.0%	11.00	73.00	15.1%	0.0%	12.00	146.00	0.08	26.00	0.13	0.00	0.27	0.00
2012	6	318.88	38.00	0.12	0.03	33.00	0.00	73.00	0.0%	0.0%	9.00	73.00	12.3%	0.0%	9.00	146.00	0.06	8.00	0.03	0.02	0.14	0.05
2011	7	135.48	11.00	0.08	0.05	32.00	1.00	64.00	1.6%	0.0%	8.00	64.00	12.5%	0.0%	9.00	128.00	0.07	7.00	0.05	0.05	0.13	0.10
2010	8	94.72	17.00	0.18	0.10	20.00	3.00	44.00	6.8%	0.0%	3.00	44.00	6.8%	2.8%	6.00	88.00	0.07	23.00	0.24	0.08	0.42	0.18


Cold Joint Issues
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.03
0.07
0.03
0.14
0.14
0.12
0.08
0.16
0.00
0.00
0.00
0.00
0.00
0.03
0.05
0.10
1
2
3
4
5
6
7
8
Age of OGFC
Avg Cold Joint Issues per Lane Mile
Achievable Cold Joint Issues per Lane Mile


Mid-Shift Issues
0.25
0.20
0.15
0.10
0.05
0.00
0.01
0.02
0.01
0.08
0.13
0.03
0.05
0.22
1
2
3
4
5
6
7
8
Avg. Mid-Shift Issues per Lane Mile
Achievable Mid-Shift Issues per Lane Mile


Cold Joint + Mid-Shift Issues
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.03
0.09
0.04
0.22
0.27
0.14
0.13
0.38
1
2
3
4
5
6
7
8
Avg Cold Joint + Mid-Shift Issues per Lane Mile
Acheivable Avg Cold Joint + Mid-Shift Issues per Lane Mile


Bridge Joint Issues
9.0%
8.0%
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
0.8%
0.9%
4.8%
7.4%
8.3%
7.1%
6.3%
3.3%
0.0%
0.0%
0.0%
0.0%
0.0%
0.0%
0.0%
0.7%
0.8%
0.8%
2.8%
1
2
3
4
5
6
7
8
Age of OGFC
% of Bridge Approaches with Issues
% of Bridge Departures with Issues
Achievable % of Bridge Approaches with Issues
Acheivable % of Bridge Departures with Issues

Appendix C

Historical Images to Indicate Rate of Deterioration

Example 1 – I-95 NB at Mile Point 85.79

Failure at Bridge Departure Joint

This Google Earth image is dated 10/15/2012 when paving in Lane 1 and Lane 2 was complete. The ramp had not been paved when this imagery was taken but the contractor's equipment parked in the median indicates that it was paved soon after.

This Google Earth image is dated 5/15/2014. Issues are visible in the left travel lane.

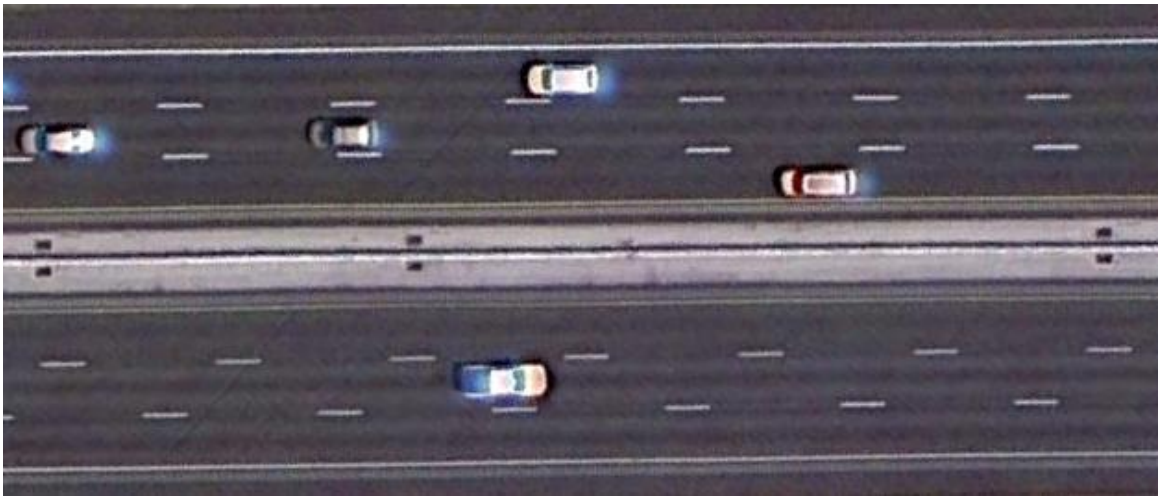
This Google Earth image is dated 11/16/2017. The OGFC in the left travel lane has raveled completely down to the underlying layer of asphalt (approximately 1”) and the middle lane has begun raveling as well.

Factual Data:

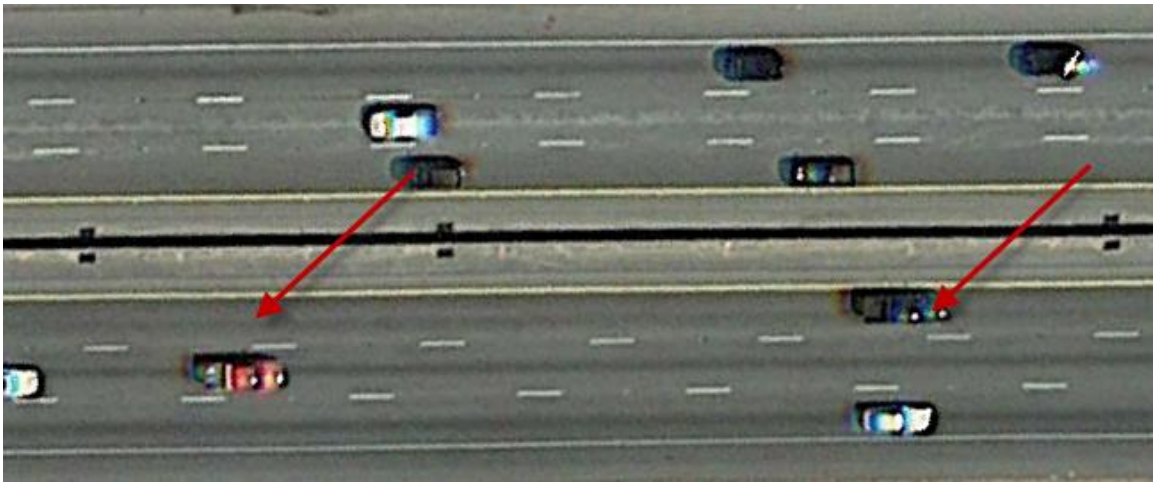
- The SCDOT expects OGFC to have a 10-year service life
- Issues were visible within 1.6 years
- **The area had completely failed before 5.1 years**

Example 2 – I-26 EB at Mile Point 206.8

Mid-Shift Raveling



This Google Earth image is dated 9/19/2010 when paving was complete.



This Google Earth image is dated 3/7/2015. The two red arrows in the left travel lane match the two red arrows in the image below. A rough texture is beginning to appear where stone is beginning to ravel from the top down.

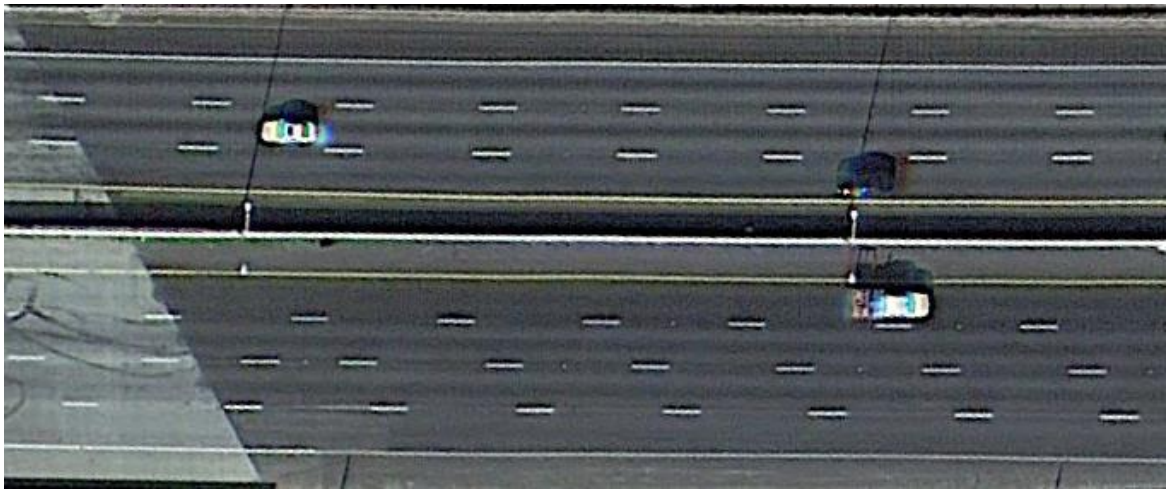
This Google Earth image is dated 2/3/2017. The OGFC in the left travel lane has raveled in parts completely down to the underlying layer of asphalt (approximately 1”) and the middle lane has begun raveling as well.

Factual Data:

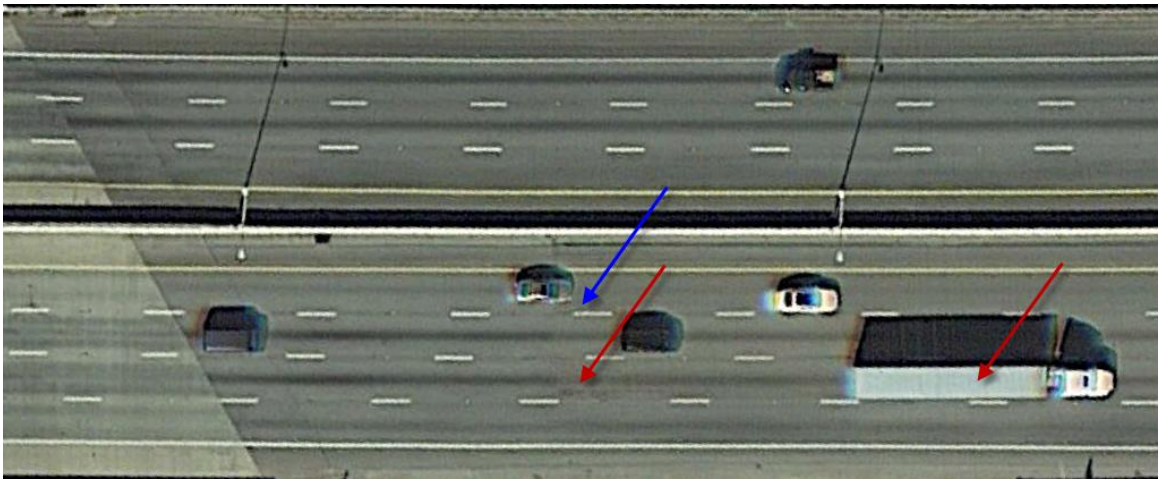
- The SCDOT expects OGFC to have a 10-year service life
- Issues were visible within 4.4 years
- **The area had completely failed before 6.4 years**

Example 3 – I-85 NB at Mile Point 44.9

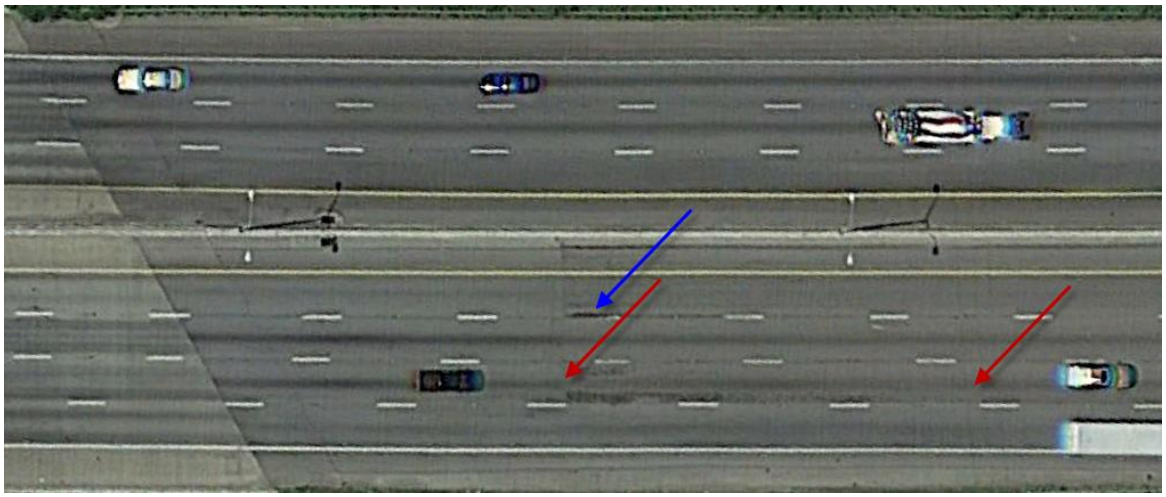
Failing Cold Joint



This Google Earth image is dated 11/25/2012 when paving was complete.



This Google Earth image is dated 10/30/2017. The red arrows arrow in the left travel lane match the two red arrows in the image below. A rough texture is visible where stone is beginning to ravel from the top down.



This Google Earth image is dated 6/3/2018. As indicated with the red arrows, the OGFC in the 3rd travel lane from the median wall has begun raveling in the right wheel path. The two red arrows align with the failed area in the picture below. The blue arrow shows a similar raveling area in the 1st travel lane.

This picture was taken on 1/10/2019 by District 3 Maintenance Engineer Tony Thompson.

Factual Data:

- The SCDOT expects OGFC to have a 10-year service life
- Issues were visible within 4.9 years
- **The area had completely failed before 5.6 years**

Example 4 – I-95 NB at Mile Point 186.44

Failing Cold Joint

This Google Earth image is dated 12/18/2011 when paving was complete. No issues are visible.

It was omitted but the image from 5/24/2013 does not indicate any raveling either.

This Google Earth image is dated 1/30/2015. The red arrow indicates where raveling has begun.

This Google Earth image is dated 2/8/2017. As indicated with the red arrow, the OGFC has substantially raveled.

This Google Earth Street View image was taken sometime in June 2018. The OGFC in the left travel lane has raveled completely down to the underlying layer of asphalt (approximately 1”) in the right wheel path and has raveled substantially in the left wheel path.

Factual Data:

- The SCDOT expects OGFC to have a 10-year service life
- Issues were visible within 3.1 years
- **The area had completely failed before 5.1 years**

Appendix D

Examples of Costs to Place and Repair OGFC

How much does it cost to remove and replace an entire segment of interstate under contract?

Example 1: Rogers Group Inc. – Lowest Bid Price for OGFC Replacement Contract

I-26 – MM 22.5 to 43.8 – Spartanburg County

This bid was modified for this report to eliminate all items except those specific to removing and replacing OGFC. The Mobilization, Bonds and Insurance, and Traffic Control were prorated (***) based on the reduction in dollar amount of remaining pay items. See pages 44-48 for bid summary.

Example 2: The Lane Construction Corp. – Lowest Bid Price for OGFC Replacement Contract

I-77 – MM 75.87 to 91.05 – York County

This bid was modified for this report to eliminate all items except those specific to removing and replacing OGFC. The Mobilization, Bonds and Insurance, Traffic Control, and CPM Schedule were prorated (***) based on the reduction in dollar amount of remaining pay items. See pages 49-52 for bid summary.

Example 1		Example 2	
Cost for New OGFC Contract I-26 EB/WB in Spartanburg (MM 22.50 - 43.80) Rogers Group Inc.		Cost for New OGFC Contract I-77 NB/SB in York Co. (MM 75.87 - 91.05) The Lane Construction Corp.	
Total Cost***	$ 10,180,811	Total Cost***	$ 9,530,828
Tons	49,564	Tons	58,300
Max SF	8,110,467	Max SF	9,540,000
Max SY	901,163	Max SY	1,060,000
Cost/SF	$ 1.26	Cost/SF	$ 1.00
Cost/SY	$ 11.30	Cost/SY	$ 8.99
Cost per 100 LF of a 12' Lane	**$ 1,882.90**	**Cost per 100 LF of a 12' Lane**	**$ 1,498.56**
	Average = $ 1,690.73		

When areas ravel, how much does it cost <u>SCDOT crews</u> to patch them?

Example 3: SCDOT Greenville Maintenance Crews Repair Various Areas

I-85 NB from 43.45 to 45.22 – Greenville County

District 3 Maintenance Crews had to respond to several areas on I-85 where OGFC had raveled completely and posed safety concerns. Over 4 days, the average cost to repair a 100 foot longs section of I-85 at a width of 12 feet was $1,768. Please see pages 53-60 for copies of the Daily Work Report.

Example 3A		Example 3B		Example 3C		Example 3D	
SCDOT Internal Costs I-85 in Greenville (MM 43.45 to 45.22) (SCDOT used Surface E)		SCDOT Internal Costs I-85 in Greenville (MM 43 to 45) (SCDOT used Surface E)		SCDOT Internal Costs I-85 in Greenville (MM 43 to 45) (SCDOT used Surface E)		SCDOT Internal Costs I-85 in Greenville (MM 43 to 45) (SCDOT used Surface E)	
Total Cost	$ 14,186.00	Total Cost	$ 18,442.00	Total Cost	$ 36,924.00	Total Cost	$ 16,287.00
Tons	48	Tons	96.55	Tons	233.75	Tons	128.52
Width	12	Width	12	Width	12	Width	12
Max Length	654	Max Length	1,316	Max Length	3,187	Max Length	1,752
Max SF	7,848	Max SF	15,795	Max SF	38,250	Max SF	21,024
Max SY	872	Max SY	1,755	Max SY	4,250	Max SY	2,336
Cost/SF	$ 1.81	Cost/SF	$ 1.17	Cost/SF	$ 0.97	Cost/SF	$ 0.77
Cost/SY	$ 16.27	Cost/SY	$ 10.51	Cost/SY	$ 8.69	Cost/SY	$ 6.97
Cost per 100 LF of a 12' Lane	**$ 2,711.39**	**Cost per 100 LF of a 12' Lane**	**$ 1,751.38**	**Cost per 100 LF of a 12' Lane**	**$ 1,448.00**	**Cost per 100 LF of a 12' Lane**	**$ 1,162.03**
			Average = $ 1,768.20				

When a multiple areas ravel along an interstate, how much does it cost to get a <u>Contractor</u> to patch them?

Example 4: Banks Construction Price to Repair OGFC in Various Areas

I-526 – Charleston

District 6 requested a price from Banks Construction to remove and replace various areas along I-526 where the OGFC had failed and posed safety concerns. Please see page 61 for a copy of the quote.

Example 4	
Cost to Contract Repairs I-526 in Charleston (Various Locations w/ OGFC) Banks Construction Co.	
Total Cost	$ 156,358.55
Tons	228
Width	12
Max Length	3,930
Max SF	47,160
Max SY	5,240
Cost/SF	$ 3.32
Cost/SY	$ 29.84
Cost per 100 LF of a 12' Lane	**$ 4,973.24**

When multiple areas fail within a short distance of each other, how much does it cost for the contractor to patch them?

Example 5: Banks Construction Price to Repair OGFC in Multiple Areas in Close Proximity

I-26 – MM 208.2 to 208.35 - Charleston

District 6 requested a price from Banks Construction to remove and replace an area on I-26 where the OGFC had failed and posed safety concerns. Please see pages 62-64 for the Change Order.

Example 5	
Cost to Contract Repairs I-26 EB in Charleston (MM 208.2 - 208.35 w/ OGFC) Banks Construction Co.	
Total Cost	$ 80,848.15
Tons	87
Width	12
Max Length	1,040
Max SF	12,483
Max SY	1,387
Cost/SF	$ 6.48
Cost/SY	$ 58.29
Cost per 100 LF of a 12' Lane	**$ 9,714.99**

Is there a cost difference if a Contractor patches an area back with OGFC as compared to patching the same area back with a dense-graded mix?

Example 6A and 6B: Lynches River Contracting Price to Repair OGFC in Isolated Area I-77 SB at MM 69.0 – York County

District 4 requested a price from Lynches River Contracting to repair one area where OGFC had failed and posed safety concerns. The area was approximately 250 feet long. They responded with two options as shown in 6A and 6B. Example 6A was priced to pave the area back with OGFC. Example 6B was priced to pave the area back with Surface Type-E. Surface Type-E is more commonly available and has a substantially lower unit cost, however, it does not drain water from the surface of the roadway like OGFC. See page 65 for a copy of the quote.

Example 6A	
Cost to Contract Repairs I-77 - York County (Single Location w/ OGFC) Lynches River Contracting	
Total Cost	$ 61,000.00
Tons	20
Width	12
Max Length	272
Max SF	3,267
Max SY	363
Cost/SF	$ 18.67
Cost/SY	$ 168.04
Cost per 100 LF of a 12' Lane	**$ 28,007.35**

Example 6B	
Cost to Contract Repairs I-77 - York County (Single Location w/ Surface E) Lynches River Contracting	
Total Cost	$ 33,045.00
Tons	20
Width	12
Max Length	272
Max SF	3,267
Max SY	363
Cost/SF	$ 10.11
Cost/SY	$ 91.03
Cost per 100 LF of a 12' Lane	**$ 15,172.18**

Example 1 Information

Rept: 4-A-E

South Carolina
Department Of Transportation
Road Summary Report By Contract

10/27/2016 1:11:42 PM

ContractNbr: 20163026 Proposalid: 4210780 Sub Ind: S Exp Ind: E

FileNbr: 42.P029701 County: Spartanburg

Miles	Route	From	To
21.30	I-0026	(22.50)0.43 from John B White Sr Blvd	(43.80)0.34 to Union Hwy (SC-49)
21.30	I-0026	(22.50)0.43 From John B White Sr Blvd	(43.80)0.34 to Union Hwy (SC-49)
42.60	<----------Total Mileage for FileNbr----------		42.P029701
42.60	<----------Total Mileage for ContractNbr----------		20163026

I certify this package was compiled under my supervision. However, quantities are estimates only and are subject to change based on field conditions. No certification is given for any existing conditions.

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER
10/28/16
No. 19825
STEPHANIE A. JACKSON-AMELL

Example 1 Information (cont.)

South Carolina Department of Transportation 9/20/2017

Contract Schedule Page 1 of 4

Contract ID: 4210780 Project(s): P029701

Apparent Low Bidder: 1RO010 ROGERS GROUP, INC.

SECTION 1 PayItems For ProjectId: P029701 ~~$10,321,302.52~~

Alt Set ID: Alt Mbr ID: $10,180,811

Proposal Line Number	Item ID / Description	Approximate Quantity and Units	Unit Price Dollars	Unit Price Cents	Bid Amount Dollars	Bid Amount Cents
0010	1031000 MOBILIZATION	LUMP SUM			171,250	~~325,000.00~~
0020	1032010 BONDS AND INSURANCE	LUMP SUM			40,310	~~76,500.00~~
0030	1071000 TRAFFIC CONTROL	LUMP SUM			281,904	~~535,000.00~~
0040	3069900 MAINTENANCE STONE	60.600 TON	100		6,060.00	
0050	4011004 ~~LIQUID ASPHALT BINDER PG64-22~~	601.000 ~~TON~~	~~410~~		~~246,410.00~~	
0060	4011008 LIQUID ASPHALT BINDER PG76-22	8,662.392 TON	555		4,807,627.56	
0070	4012120 ~~FULL DEPTH ASPH. PAV. PATCHING~~ 12"UNIF	6,060.000 ~~SY~~	~~94.25~~		~~571,155.00~~	
0080	4013100 MILLING EXISTING ASPHALT PAVEMENT 1.0"	249,920.000 SY	0.95		237,424.00	
0090	4013200 ~~MILLING EXISTING ASPHALT~~ PAVEMENT 2.0"	43,952.000 ~~SY~~	~~2.35~~		~~103,287.20~~	
0100	4013300 ~~MILLING EXISTING ASPHALT~~ PAVEMENT 3.0"	945,275.000 ~~SY~~	~~2~~		~~1,890,550.00~~	
0110	4019000 MILLED-IN RUMBLE STRIP	85.200 MI	310		26,412.00	
0120	4030310 ~~HOT MIX ASPHALT SURFACE~~ COURSE TYPE A	98,922.398 ~~TON~~	~~54.25~~		~~5,366,540.09~~	

Example 1 Information (cont.)

South Carolina Department of Transportation 9/20/2017

Contract Schedule Page 2 of 4

Contract ID: 4210780 Project(s): P029701

Apparent Low Bidder: 1RO010 ROGERS GROUP, INC.

SECTION 1 PayItems For ProjectId: P029701 $19,321,302.52

Alt Set ID: Alt Mbr ID:

Proposal Line Number	Item ID / Description	Approximate Quantity and Units	Unit Price Dollars	Unit Price Cents	Bid Amount Dollars	Bid Amount Cents
0130	4030360 HOT MIX ASPHALT SURFACE COURSE TYPE E	9,246.000 TON	54.90		507,605.40	
0140	4092000 OPEN-GRADED FRICTION COURSE	49,564.000 TON	79.75		3,952,729.00	
0150	6021120 PERMANENT CONSTRUCTION SIGNS (GROUND MOUNTED)	540.000 SF	6.70		3,618.00	
0160	6250007 6" WHITE BROKEN LINES -(GAPS EXCLUDED)-FAST DRY PAINT	353,592.000 LF	0.1240		43,845.41	
0170	6250012 6" WHITE SOLID LINES (PVT. EDGE LINES)-FAST DRY PAINT	1,446,798.000 LF	0.1030		149,020.19	
0180	6250020 12" WHITE SOLID LINES - FAST DRY PAINT	17,616.000 LF	0.23		4,051.68	
0190	6250025 24" WHITE SOLID LINES (STOP/DIAGONAL LINES)-FAST DRY PAINT	720.000 LF	1.55		1,116.00	
0200	6250030 WHITE SINGLE ARROW (LEFT, STRAIGHT, RIGHT)-FAST DRY PAINT	8.000 EA	25.80		206.40	
0210	6250040 WHITE COMBINATION ARROW(STR.& RT.OR STR.& LT.)FAST DRY PAINT	4.000 EA	36.10		144.40	
0220	6250111 6"YELLOW SOLID LINE(PVT.EDGE&NO PASSING ZONE)-FAST DRY PAINT	1,438,098.000 LF	0.1030		148,124.09	

Example 1 Information (cont.)

South Carolina Department of Transportation 9/20/2017

Contract Schedule Page 3 of 4

Contract ID: 4210780 Project(s): P029701

Apparent Low Bidder: 1RO010 ROGERS GROUP, INC.

SECTION 1 PayItems For ProjectId: P029701 $19,321,302.52

Alt Set ID: Alt Mbr ID:

Proposal Line Number	Item ID / Description	Approximate Quantity and Units	Unit Price Dollars	Unit Price Cents	Bid Amount Dollars	Bid Amount Cents
0230	6262007 6" WHITE BROKEN LINES -(GAPS EXCLUDED) EPOXY PAINT	760.000 LF	0.88		668.80	
0240	6262012 6" WHITE SOLID LINES (PVT. EDGE LINES) EPOXY PAINT	3,184.000 LF	0.88		2,801.92	
0250	6262112 6"YELLOW SOLID LINES-PVT.EDGE&NO PASS. ZONE - EPOXY PAINT	3,184.000 LF	0.88		2,801.92	
0260	6271007 6" WHITE BROKEN LINES(GAPS EXCL.)THERMOPLASTIC- 90 MIL.	58,932.000 LF	0.60		35,359.20	
0270	6271012 6" WHITE SOLID LINES (PVT. EDGE LINES) THERMO.- 90 MIL.	241,133.000 LF	0.5150		124,183.50	
0280	6271020 12" WHITE SOLID LINES - THERMO. - 125 MIL.	2,936.000 LF	1.30		3,816.80	
0290	6271025 24" WHITE SOLID LINES (STOP/DIAG LINES)-THERMO.-125 MIL	360.000 LF	8.50		3,060.00	
0300	6271030 WHITE SINGLE ARROWS (LT, STRGHT, RT) THERMO.-125 MIL.	4.000 EA	92.80		371.20	
0310	6271040 WHITE COMBINATION ARROWS(STR&RT.OR STR& LT)THERMO-125MIL	2.000 EA	110		220.00	
0320	6271076 6" YELLOW SOLID LINES(PVT.EDGE LINES) THERMO-90 MIL.	239,683.000 LF	0.5150		123,436.75	

Example 1 (cont.)

South Carolina Department of Transportation 9/20/2017

Contract Schedule Page 4 of 4

Contract ID: 4210780 Project(s): P029701

Apparent Low Bidder: 1RO010 ROGERS GROUP, INC.

SECTION 1 PayItems For ProjectId: P029701 $19,321,302.52

Alt Set ID: Alt Mbr ID:

Proposal Line Number	Item ID / Description	Approximate Quantity and Units	Unit Price Dollars	Unit Price Cents	Bid Amount Dollars	Bid Amount Cents
0330	6302001 PERM.RED/CLEAR PAVEMENT MARKERS BI-DIR. - 4"X 4"	3,316.000 EA	3.10		10,279.60	
0340	6750275 ~~FURNISH & INSTALL 1.0" SCHEDULE 80 PVC CONDUIT~~	209.000 ~~LF~~	~~7.75~~		~~1,619.75~~	
0350	6770413 ~~FURNISH & INSTL NO. 14 COPPER WIRE,1-CONDUCTOR FOR LOOP WIRE~~	3,766.000 ~~LF~~	~~0.31~~		~~1,167.46~~	
0360	6780495 ~~SAWCUT FOR LOOP DETECTOR~~	1,366.000 ~~LF~~	~~6.20~~		~~8,469.20~~	
0370	6800518 ~~F&I-13"X24"X18"D.ELEC.FLUSH UNDGRD.ENCLOS-(STR.POLY.CONC.)HD~~	2.000 ~~EA~~	~~310~~		~~620.00~~	

Total Bid: ~~$19,321,302.52~~

Prorated Bid: $10,180,811

Example 2 Information

South Carolina Department of Transportation 3/20/2014

Contract Schedule Page 1 of 4

Contract ID: 4680840 Project(s): P026812

Apparent Low Bidder: 1TH013 THE LANE CONSTRUCTION CORPORATION

SECTION 1 From: 0.38 mi S of Firetower Rd. To: North Carolin ~~$10,541,327.75~~

Alt Set ID: Alt Mbr ID: $9,873,511.62

Proposal Line Number	Item ID / Description	Approximate Quantity and Units	Unit Price Dollars	Unit Price Cents	Bid Amount Dollars	Bid Amount Cents
0010	1031000 MOBILIZATION	LUMP SUM		$468,323.91		~~500,000.00~~
0020	1032010 BONDS AND INSURANCE	LUMP SUM		$187,329.56		~~200,000.00~~
0030	1071000 TRAFFIC CONTROL	LUMP SUM		$280,994.34		~~300,000.00~~
0040	1080300 CPM PROGRESS SCHEDULE	LUMP SUM		$9,834.80		10,500.00
0050	4011008 LIQUID ASPHALT BINDER PG76-22	4,107.500 TON	752			3,088,840.00
0060	4012100 FULL DEPTH ASPH. PAV. PATCHING 10"UNIF	1,000.000 SY	90			~~90,000.00~~
0070	4013099 SURFACE PLANE ASPHALT PAVEMENT - VARIABLE	1,060,000.000 SY	1.30			1,378,000.00
0080	4013200 MILLING EXISTING ASPHALT PAVEMENT 2.0"	31,800.000 SY	2			~~63,600.00~~
0090	4019000 MILLED-IN RUMBLE STRIP	22.400 MI	750			16,800.00
0100	4030310 HOT MIX ASPHALT SURFACE COURSE TYPE A	3,180.000 TON	60			~~190,800.00~~
0110	4092000 OPEN-GRADED FRICTION COURSE	58,300.000 TON	64.75			3,774,925.00
0115	5021020 FULL DEPTH CONCRETE PAVEMENT PATCH - 9"	800.000 SY	240			~~192,000.00~~

Example 2 Information (cont.)

South Carolina Department of Transportation 3/20/2014

Contract Schedule Page 2 of 4

Contract ID: 4680840 Project(s): P026812

Apparent Low Bidder: 1TH013 THE LANE CONSTRUCTION CORPORATION

SECTION 1 From: 0.38 mi S of Firetower Rd. To: North Carolin ~~$10,541,327.75~~

Alt Set ID: Alt Mbr ID:

Proposal Line Number	Item ID / Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0120	6051120 PERMANENT CONSTRUCTION SIGNS (GROUND MOUNTED)	1,276.000 SF	1		1,276.00	
0130	6092100 TEMPORARY CLEAR PAVEMENT MARKERS MONO-DIR.- 4"X4"	15,000.000 EA	5		75,000.00	
0140	6250007 6" WHITE BROKEN LINES -(GAPS EXCLUDED)-FAST DRY PAINT	255,000.000 LF	0.12		30,600.00	
0150	6250012 6" WHITE SOLID LINES (PVT. EDGE LINES)-FAST DRY PAINT	330,000.000 LF	0.12		39,600.00	
0160	6250020 12" WHITE SOLID LINES - FAST DRY PAINT	37,500.000 LF	0.25		9,375.00	
0170	6250043 WHITE LANE DROP ARROW (LEFT OR RIGHT)-FAST DRY PAINT	16.000 EA	65		1,040.00	
0180	6250111 6"YELLOW SOLID LINE(PVT.EDGE&NO PASSING ZONE)-FAST DRY PAINT	321,000.000 LF	0.12		38,520.00	
0190	6250115 24" YELLOW DIAGONAL LINES - FAST DRY PAINT	3,200.000 LF	2.50		8,000.00	
0200	6271007 6" WHITE BROKEN LINES(GAPS EXCL.)THERMOPLASTIC- 90 MIL.	131,100.000 LF	0.85		111,435.00	
0210	6271012 6" WHITE SOLID LINES (PVT. EDGE LINES) THERMO.- 90 MIL.	210,500.000 LF	0.60		126,300.00	

Example 2 Information (cont.)

South Carolina Department of Transportation 3/20/2014

Contract Schedule Page 3 of 4

Contract ID: 4680840 Project(s): P026812

Apparent Low Bidder: 1TH013 THE LANE CONSTRUCTION CORPORATION

SECTION 1 From: 0.38 mi S of Firetower Rd. To: North Carolin ~~$10,541,327.75~~

Alt Set ID: Alt Mbr ID:

Proposal Line Number	Item ID / Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0220	6271020 12" WHITE SOLID LINES - THERMO. - 125 MIL.	26,450.000 LF	1.50		39,675.00	
0230	6271024 24IN X 36IN WHITE TRIANG. YIELD BAR (GAPS EXC)THERMO-125MIL	60.000 LF	25		1,500.00	
0240	6271025 24" WHITE SOLID LINES (STOP/DIAG LINES)-THERMO.-125 MIL	2,500.000 LF	5		12,500.00	
0250	6271030 WHITE SINGLE ARROWS (LT, STRGHT, RT) THERMO.-125 MIL.	46.000 EA	100		4,600.00	
0260	6271035 WHITE WORD MESSAGE "ONLY" -THERMOPLASTIC - 125 MIL.	39.000 EA	225		8,775.00	
0270	6271040 WHITE COMBINATION ARROWS(STR&RT.OR STR& LT)THERMO-125MIL	18.000 EA	125		2,250.00	
0280	6271043 WHITE LANE DROP ARROW(LT.OR RT.)THERMO-125MIL	11.000 EA	125		1,375.00	
0290	6271076 6" YELLOW SOLID LINES(PVT.EDGE LINES) THERMO-90 MIL.	203,000.000 LF	0.60		121,800.00	
0300	6271080 24" YELLOW SOLID LINES - THERMOPLASTIC - 125 MIL.	1,800.000 LF	3.50		6,300.00	
0310	6302001 PERM.RED/CLEAR PAVEMENT MARKERS BI-DIR. - 4"X 4"	7,820.000 EA	3.65		28,543.00	
0320	6750207 1.0" SCHEDULE 40 PVC CONDUIT	450.000 LF	5		~~2,250.00~~	

Example 2 Information (cont.)

South Carolina Department of Transportation 3/20/2014

Contract Schedule Page 4 of 4

Contract ID: 4680840 Project(s): P026812

Apparent Low Bidder: 1TH013 THE LANE CONSTRUCTION CORPORATION

SECTION 1 From: 0.38 mi S of Firetower Rd. To: North Carolin ~~$10,541,327.75~~

Alt Set ID: Alt Mbr ID:

Proposal Line Number	Item ID / Description	Approximate Quantity and Units	Unit Price Dollars	Unit Price Cents	Bid Amount Dollars	Bid Amount Cents
0330	6750213 2.0" SCHEDULE 40 PVC CONDUIT	675.000 LF	5.25			~~3,543.75~~
0340	6750248 2.0" SCHEDULE 40 PVC CONDUIT - 90 DEGREE BEND	18.000 EA	15			~~270.00~~
0350	675027S FURNISH & INSTALL 2.0" SCHD 80 PVC CONDUIT (DIRECTION.BORED)	675.000 LF	20			~~13,500.00~~
0360	6770389 FURNISH & INSTALL NO. 14 COPPER WIRE, 4 CONDUCTOR - GRAY	3,600.000 LF	1.50			~~5,400.00~~
0370	6770413 FURNISH & INSTL NO. 14 COPPER WIRE,1-CONDUCTOR FOR LOOP WIRE	4,500.000 LF	0.20			~~900.00~~
0380	6780495 SAWCUT FOR LOOP DETECTOR	1,350.000 LF	4.50			~~6,075.00~~
0390	6969505 PIEZO CABLE SENSOR-6' CLASS II	18.000 EA	1500			~~27,000.00~~
0400	6969550 8"X12"X12" PVC UNDERGROUND WATERTIGHT ENCLOSURE	72.000 EA	100			~~7,200.00~~
0410	6969590 SAWCUT FOR PIEZO SENSOR	126.000 LF	10			~~1,260.00~~

Total Bid: ~~$10,541,327.75~~

$9,873,511.62

Example 3A Information

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
HIGHWAY MAINTENANCE MANAGEMENT SYSTEM

Daily Work Report

Organization Unit	District	Date	Report No.
35703 D3 - FULL DEPTH PATCH	THREE	SUNDAY - JAN 27, 2019	13921862

Activity	Work Description	Work County	Asset Group
102 SURFACE REPAIRS	MAJOR LEVELING/STREN	GREENVILLE	

Asset	Special Event	Project Number
		453

Type	Route	Aux	Begin MP	End MP	Length	Direction	Position	Off System Description
I	85	00	43.45	45.22	1.77	N	ROADWAY	

Units of Accomplishment: 46.000 UOM:TONS Accident:N

	Labor	Equipment	Material	Total
Daily Cost:	5,074.	6,196.	2,916.	14,186.

Number	Description	Org/UOM	Quantity	Hours	Unit Cost	DWR Cost
Labor						
10053372	TAYLOR RANDY D	32315		8.0		221.
10053450	KELLEY JEFFREY S	35701		8.5		315.
10053722	DAVIS JUSTIN L	32315		8.0		234.
10056029	WILSON CHRISTOPHER D	35703		8.0		212.
10062921	MCALISTER DAVID C	35703		8.0		219.
10069072	STARLING JUSTIN L	32315		8.0		216.
10071829	ORSBORNE CHARLES W Sr	35701		8.5		337.
10073652	GRIFFIN GEORGE L Jr	35702		8.5		225.
10074751	BLACK WILLIAM C	35703		8.0		186.
10083628	DAVIS BRADY A	32311		8.0		233.
10090003	LOOPER AARON L	35703		8.0		210.
10092095	OWINGS JACOB A	32315		8.0		183.
10097237	SMITH JOHNNY R	32315		8.0		187.
10098606	COULTER MICHAEL B	35702		8.5		259.
10099621	RHINEHART QUENTIN T	32311		8.5		243.
10099776	OVERSTREET RICKEY E.	35702		8.5		224.
10101637	MILLS, DYLAN M.	32315		8.0		172.
10104360	WHITMAN ERIC A	32311		8.5		199.
10124345	SENERCHIA BRIAN F	35703		8.0		230.
10125939	WILLIAMS WILLIAM S	32311		8.5		199.
10128206	LANDERS THOMAS J	32311		8.5		173.
10129196	CRAIN KEVIN M	32315		8.0		207.
10132165	SHOCKLEY JOSHUA W	35703		8.0		190.
Equipment						
008-01-0682	1/2 TON P-UP STAND CAB FU	35701		8.0	12.30	98.
009-02-0318	3/4 TON PICKUP CREW CAB	35702		8.0	13.40	107.
010-03-0398	TRK, 1 TON UTILITY CREW C	35702		8.0	17.65	141.
011-03-0470	TRK, 1.5 TON UTILITY CREW	35702		8.0	22.25	178.
011-03-0484	TRK, 1.5 TON UTILITY CREW	35703		7.0	22.25	156.
011-03-0522	TRK, 1.5 TON UTILITY CREW	35703		7.0	22.25	156.
012-03-1360	TRK, 8-13TON HERBICIDE	35703		7.0	31.00	217.
012-04-0341	TRK, 8-13 TON PLATFORM	35703		7.0	31.00	217.
013-04-0136	TRK, 13-16 TON PLATFORM	35703		7.0	32.00	224.
014-01-0022	TRK, >16.5 TN 2P DMP /8YD	32309		7.0	48.90	342.
014-01-0024	TRK, >16.5 TN 2P DMP /8YD	32309		7.0	48.90	342.

30-JAN-19 07:39:40 1 of 2

Example 3A Information (cont.)

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
HIGHWAY MAINTENANCE MANAGEMENT SYSTEM

Daily Work Report

Organization Unit	District	Date	Report No.
35703 D3 - FULL DEPTH PATCH	THREE	SUNDAY - JAN 27, 2019	13921062

Activity	Work Description	Work County	Asset Group
102 SURFACE REPAIRS	MAJOR LEVELING/STREN	GREENVILLE	

Asset	Special Event	Project Number
		453

Type	Route	Aux	Begin MP	End MP	Length	Direction	Position	Off System Description
I	85	00	43.45	45.22	1.77	N	ROADWAY	

Units of Accomplishment: 46.000 UOM:TONS Accident:N

	Labor	Equipment	Material	Total
Daily Cost:	5,074.	6,196.	2,916.	14,186.

Number	Description	Org/UOM	Quantity	Hours	Unit Cost	DWR Cost
Equipment						
014-01-0140	TRK, >16.5 TN 3P DMP 8YD	32309		7.0	48.90	342.
014-03-0266	TRK, >16.5 TON BOOM	35702		8.0	48.90	391.
014-04-0123	TRK, >16.5 TON LOWBOY TRC	35703		7.0	48.90	342.
021-13-0001	TRAILER, EQUIPMENT, TILTB	35703		7.0	14.15	99.
022-29-0017	TRAILER, HEAVY LOWBOY	35703		7.0	15.50	109.
025-38-0116	TRAILER UTILITY SIGN/BARR	35703		7.0	37.75	264.
073-02-0001	MILLING MACHINE, PAVEMENT	35703		7.0	135.00	945.
117-05-0015	LOADER, SKID-STEER	32331		7.0	14.15	99.
145-01-0008	PAVER, ASPHALT, CRAWLER	35703		7.0	203.65	1,426.
Material						
1005 DP	HFMS-2 ASPHALT LIQUID	GALS	10.00		3.62	36.
1023 DP	TYPE3 ASPHALT PLT MIX HOT	TONS	48.00		60.00	2,880.

DWR Comment: MILLED AND REPAVED FAILED AREA OF ASPHALT BETWEEN US25 AND SC291

	Work Request Number	Requested Date
Linked Work Requests:	200543	01/11/2019

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Example 3B Information

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
HIGHWAY MAINTENANCE MANAGEMENT SYSTEM

Daily Work Report

Organization Unit	District	Date	Report No.
35703 D3 - FULL DEPTH PATCH	THREE	FRIDAY - FEB 01, 2019	13933265

Activity	Work Description	Work County	Asset Group
102 SURFACE REPAIRS	MAJOR LEVELING/STREN	GREENVILLE	

Asset	Special Event	Project Number
		453

Type	Route	Aux	Begin MP	End MP	Length	Direction	Position	Off System Description
I	85	00	43.00	45.00	2.00	N	ROADWAY	

Units of Accomplishment: 50.000 UOM:TONS Accident:N

	Labor	Equipment	Material	Total
Daily Cost:	5,049.	7,419.	5,974.	18,442.

Number	Description	Org/UOM	Quantity	Hours	Unit Cost	DWR Cost
Labor						
10053372	TAYLOR RANDY D	32315		9.0		248.
10053450	KELLEY JEFFREY S	35701		8.0		297.
10053722	DAVIS JUSTIN L	32315		10.5		307.
10056029	WILSON CHRISTOPHER D	35703		11.5		304.
10062921	MCALISTER DAVID C	35703		10.0		273.
10069072	STARLING JUSTIN L	32315		10.5		284.
10073652	GRIFFIN GEORGE L Jr	35702		7.0		185.
10074751	BLACK WILLIAM C	35703		12.7		295.
10083628	DAVIS BRADY A	32311		9.0		263.
10086563	O'CONNOR RANDY J	35705		8.0		158.
10090003	LOOPER AARON L	35703		9.0		236.
10092095	OWINGS JACOB A	32315		9.0		206.
10097237	SMITH JOHNNY R	32315		9.0		210.
10098606	COULTER MICHAEL B	35702		7.0		213.
10099621	RHINEHART QUENTIN T	32311		9.0		257.
10101637	MILLS, DYLAN M.	32315		9.0		194.
10104360	WHITMAN ERIC A	32311		8.0		187.
10124345	SENERCHIA BRIAN F	35703		7.0		202.
10125939	WILLIAMS WILLIAM S	32311		8.0		188.
10128206	LANDERS THOMAS J	32311		7.0		143.
10129196	CRAIN KEVIN M	32315		9.0		233.
10132165	SHOCKLEY JOSHUA W	35703		7.0		166.
Equipment						
009-01-0468	3/4 TON UTILITY 4WD EXTEN	32331		7.0	13.40	94.
009-03-0603	3/4 TON PICKUP STANDARD C	32315		9.0	13.40	121.
009-03-0696	3/4 TON PICKUP STANDARD C	32311		7.0	13.40	94.
009-03-0705	TRK, 3/4 TON UTILITY STAN	32315		10.5	13.40	141.
011-03-0443	TRK, 1.5 TON PLATFORM DUM	32316		7.0	22.25	156.
011-03-0484	TRK, 1.5 TON UTILITY CREW	35703		7.0	22.25	156.
011-03-0497	TRK, 1.5 TON SIGN	32315		9.0	22.25	200.
011-03-0522	TRK, 1.5 TON UTILITY CREW	35703		7.0	22.25	156.
012-03-1360	TRK, 8-13TON HERBICIDE	35703		7.0	31.00	217.
012-04-0341	TRK, 8-13 TON PLATFORM	35703		7.0	31.00	217.
013-04-0136	TRK, 13-16 TON PLATFORM	35703		7.0	32.00	224.
014-01-0024	TRK, >16.5 TN 2P DMP /8YD	32309		7.0	48.90	342.

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Example 3B Information (cont.)

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
HIGHWAY MAINTENANCE MANAGEMENT SYSTEM

Daily Work Report

Organization Unit	District	Date	Report No.
35703 D3 - FULL DEPTH PATCH	THREE	FRIDAY - FEB 01, 2019	13933265

Activity	Work Description	Work County	Asset Group
102 SURFACE REPAIRS	MAJOR LEVELING/STREN	GREENVILLE	

Asset							Special Event	Project Number
								453
Type	Route	Aux	Begin MP	End MP	Length	Direction	Position	Off System Description
I	85	00	43.00	45.00	2.00	N	ROADWAY	

Units of Accomplishment: 50.000 UOM:TONS Accident:N

	Labor	Equipment	Material	Total
Daily Cost:	5,049.	7,419.	5,974.	18,442.

Number	Description	Org/UOM	Quantity	Hours	Unit Cost	DWR Cost
Equipment						
014-01-0140	TRK, >16.5 TN 3P DMP 8YD	32309		7.0	48.90	342.
014-04-0123	TRK, >16.5 TON LOWBOY TRC	35703		7.0	48.90	342.
014-04-0181	TRUCK, >16.5 TON 10 YD DU	32315		9.0	48.90	440.
021-13-0001	TRAILER, EQUIPMENT, TILTB	35703		7.0	14.15	99.
021-38-0119	TRAILER, LW BED SIGN/BARR	32331		7.0	14.15	99.
022-29-0017	TRAILER, HEAVY LOWBOY	35703		7.0	15.50	109.
025-38-0116	TRAILER UTILITY SIGN/BARR	35703		7.0	37.75	264.
026-04-0001	TRAILER, CARGO	35703		7.0	37.75	264.
053-08-0003	CENTERLINE MARKER SKID MN	35703		7.0	4.00	28.
054-08-0001	CENTERLINE MARKER, SELF P	35703		7.0	16.20	113.
073-02-0001	MILLING MACHINE, PAVEMENT	35703		7.0	135.00	945.
145-01-0008	PAVER, ASPHALT, CRAWLER	35703		7.0	203.65	1,426.
188-02-0054	SWEEPER, SELF-PROPELLED U	35703		7.0	76.70	537.
234-07-0138	ARROWBOARD, SOLAR	32311		7.0	4.43	31.
234-07-0139	ARROWBOARD, SOLAR	32312		7.0	4.43	31.
234-07-0140	ARROWBOARD, SOLAR	32313		7.0	4.43	31.
235-08-0112	MESSAGE BOARD, SOLAR POWE	32309		7.0	11.61	81.
235-08-0116	MESSAGE BOARD, SOLAR POWE	33901		7.0	11.61	81.
243-01-0214	CRASH ATTENUATOR W/ MESSA	32313		7.0	5.50	39.
Material						
1005 DP	HFMS-2 ASPHALT LIQUID	GALS	50.00		3.62	181.
1022 DP	TYPE2 ASPHALT PLT MIX HOT	TONS	96.55		60.00	5,793.

DWR Comment:

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Example 3C Information

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
HIGHWAY MAINTENANCE MANAGEMENT SYSTEM

Daily Work Report

Organization Unit	District	Date	Report No.
35703 D3 - FULL DEPTH PATCH	THREE	WEDNESDAY - JAN 30, 2019	13932728

Activity	Work Description	Work County	Asset Group
102 SURFACE REPAIRS	MAJOR LEVELING/STREN	GREENVILLE	

Asset	Special Event	Project Number
		453

Type	Route	Aux	Begin MP	End MP	Length	Direction	Position	Off System Description
I	85	00	43.00	45.00	2.00	S	ROADWAY	

Units of Accomplishment: 155.000 UOM:TONS Accident:N

	Labor	Equipment	Material	Total
Daily Cost:	9,337.	13,109.	14,478.	36,924.

Number	Description	Org/UOM	Quantity	Hours	Unit Cost	DWR Cost
Labor						
10053372	TAYLOR RANDY D	32315		18.0		496.
10053450	KELLEY JEFFREY S	35701		14.5		538.
10053722	DAVIS JUSTIN L	32315		18.0		527.
10056029	WILSON CHRISTOPHER D	35703		14.0		370.
10062921	MCALISTER DAVID C	35703		14.0		383.
10069072	STARLING JUSTIN L	32315		18.0		487.
10073652	GRIFFIN GEORGE L Jr	35702		14.0		370.
10074751	BLACK WILLIAM C	35703		14.0		326.
10083628	DAVIS BRADY A	32311		18.0		525.
10086563	O'CONNOR RANDY J	35705		14.5		286.
10090003	LOOPER AARON L	35703		14.0		367.
10092095	OWINGS JACOB A	32315		10.0		229.
10097237	SMITH JOHNNY R	32315		18.0		420.
10098606	COULTER MICHAEL B	35702		14.0		426.
10099621	RHINEHART QUENTIN T	32311		17.0		486.
10099776	OVERSTREET RICKEY E.	35702		14.0		369.
10101637	MILLS, DYLAN M.	32315		18.0		388.
10104360	WHITMAN ERIC A	32311		17.0		397.
10124345	SENERCHIA BRIAN F	35703		14.0		403.
10125939	WILLIAMS WILLIAM S	32311		17.0		399.
10128206	LANDERS THOMAS J	32311		17.0		347.
10129196	CRAIN KEVIN M	32315		18.0		465.
10132165	SHOCKLEY JOSHUA W	35703		14.0		333.
Equipment						
009-03-0603	3/4 TON PICKUP STANDARD C	32315		18.0	13.40	241.
009-03-0662	TRK, 3/4 TON UTILITY CREW	35703		8.0	13.40	107.
009-03-0696	3/4 TON PICKUP STANDARD C	32311		16.0	13.40	214.
009-03-0705	TRK, 3/4 TON UTILITY STAN	32315		18.0	13.40	241.
010-03-0278	TRK, 1 TON UTILITY CREW C	35703		14.0	17.65	247.
011-03-0484	TRK, 1.5 TON UTILITY CREW	35703		14.0	22.25	312.
011-03-0497	TRK, 1.5 TON SIGN	32315		18.0	22.25	401.
011-03-0522	TRK, 1.5 TON UTILITY CREW	35703		14.0	22.25	312.
012-03-1360	TRK, 8-13TON HERBICIDE	35703		14.0	31.00	434.
012-04-0341	TRK, 8-13 TON PLATFORM	35703		14.0	31.00	434.
013-04-0136	TRK, 13-16 TON PLATFORM	35703		14.0	32.00	448.

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Example 3C Information (cont.)

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
HIGHWAY MAINTENANCE MANAGEMENT SYSTEM

Daily Work Report

Organization Unit	District	Date	Report No.
35703 D3 - FULL DEPTH PATCH	THREE	WEDNESDAY - JAN 30, 2019	13932728

Activity	Work Description	Work County	Asset Group
102 SURFACE REPAIRS	MAJOR LEVELING/STREN	GREENVILLE	

Asset	Special Event	Project Number
		453

Type	Route	Aux	Begin MP	End MP	Length	Direction	Position	Off System Description
I	85	00	43.00	45.00	2.00	S	ROADWAY	

Units of Accomplishment: 155.000 UOM:TONS Accident:N

	Labor	Equipment	Material	Total
Daily Cost:	9,337.	13,109.	14,478.	36,924.

Number	Description	Org/UOM	Quantity	Hours	Unit Cost	DWR Cost
Equipment						
014-04-0123	TRK, >16.5 TON LOWBOY TRC	35703		14.0	48.90	685.
014-04-0181	TRUCK, >16.5 TON 10 YD DU	32315		18.0	48.90	880.
021-13-0001	TRAILER, EQUIPMENT, TILTB	35703		14.0	14.15	198.
022-29-0017	TRAILER, HEAVY LOWBOY	35703		14.0	15.50	217.
025-38-0116	TRAILER UTILITY SIGN/BARR	35703		14.0	37.75	529.
026-04-0001	TRAILER, CARGO	35703		14.0	37.75	529.
053-08-0003	CENTERLINE MARKER SKID MN	35703		14.0	4.00	56.
054-08-0001	CENTERLINE MARKER, SELF P	35703		14.0	16.20	227.
073-02-0001	MILLING MACHINE, PAVEMENT	35703		14.0	135.00	1,890.
145-01-0008	PAVER, ASPHALT, CRAWLER	35703		14.0	203.65	2,851.
188-02-0054	SWEEPER, SELF-PROPELLED U	35703		14.0	76.70	1,074.
234-07-0138	ARROWBOARD, SOLAR	32311		16.0	4.43	71.
234-07-0139	ARROWBOARD, SOLAR	32312		16.0	4.43	71.
234-07-0140	ARROWBOARD, SOLAR	32313		16.0	4.43	71.
235-08-0112	MESSAGE BOARD, SOLAR POWE	32309		16.0	11.61	186.
235-08-0116	MESSAGE BOARD, SOLAR POWE	33901		16.0	11.61	186.
Material						
1005 DP	HFMS-2 ASPHALT LIQUID	GALS	125.00		3.62	453.
1023 DP	TYPE3 ASPHALT PLT MIX HOT	TONS	233.75		60.00	14,025.

DWR Comment: PATCHING

	Work Request Number	Requested Date
Linked Work Requests:	198309	01/10/2019
	200543	01/11/2019
	201505	01/12/2019

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Example 3 D Information

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
HIGHWAY MAINTENANCE MANAGEMENT SYSTEM
Daily Work Report

Organization Unit	District	Date	Report No.
35703 D3 - FULL DEPTH PATCH	THREE	TUESDAY - JAN 29, 2019	13932594

Activity	Work Description	Work County	Asset Group
102 SURFACE REPAIRS	MAJOR LEVELING/STREN	GREENVILLE	

Asset	Special Event	Project Number
		453

Type	Route	Aux	Begin MP	End MP	Length	Direction	Position	Off System Description
I	85	00	43.00	45.00	2.00	S	ROADWAY	

Units of Accomplishment: 115.000 UOM:TONS Accident:N

	Labor	Equipment	Material	Total
Daily Cost:	3,544.	4,815.	7,928.	16,287.

Number	Description	Org/UOM	Quantity	Hours	Unit Cost	DWR Cost
Labor						
10053372	TAYLOR RANDY D	32315		7.0		193.
10053450	KELLEY JEFFREY S	35701		5.0		185.
10053722	DAVIS JUSTIN L	32315		7.0		205.
10056029	WILSON CHRISTOPHER D	35703		5.0		132.
10062921	MCALISTER DAVID C	35703		5.0		137.
10069072	STARLING JUSTIN L	32315		7.0		189.
10073652	GRIFFIN GEORGE L Jr	35702		5.0		132.
10074751	BLACK WILLIAM C	35703		5.5		128.
10083628	DAVIS BRADY A	32311		7.0		204.
10086563	O'CONNOR RANDY J	35705		5.0		99.
10090003	LOOPER AARON L	35703		5.0		131.
10092095	OWINGS JACOB A	32315		7.0		160.
10097237	SMITH JOHNNY R	32315		7.0		164.
10098606	COULTER MICHAEL B	35702		5.0		152.
10099621	RHINEHART QUENTIN T	32311		8.0		229.
10099776	OVERSTREET RICKEY E.	35702		5.0		132.
10101637	MILLS, DYLAN M.	32315		7.0		151.
10104360	WHITMAN ERIC A	32311		6.0		140.
10124345	SENERCHIA BRIAN F	35703		4.5		130.
10125939	WILLIAMS WILLIAM S	32311		6.0		141.
10128206	LANDERS THOMAS J	32311		6.0		122.
10129196	CRAIN KEVIN M	32315		7.0		181.
10132165	SHOCKLEY JOSHUA W	35703		4.5		107.
Equipment						
009-03-0603	3/4 TON PICKUP STANDARD C	32315		7.0	13.40	94.
009-03-0705	TRK, 3/4 TON UTILITY STAN	32315		7.0	13.40	94.
011-03-0484	TRK, 1.5 TON UTILITY CREW	35703		5.0	22.25	111.
011-03-0497	TRK, 1.5 TON SIGN	32315		7.0	22.25	156.
011-03-0522	TRK, 1.5 TON UTILITY CREW	35703		5.0	22.25	111.
012-03-1360	TRK, 8-13TON HERBICIDE	35703		5.0	31.00	155.
012-04-0341	TRK, 8-13 TON PLATFORM	35703		5.0	31.00	155.
013-04-0136	TRK, 13-16 TON PLATFORM	35703		5.0	32.00	160.
014-01-0024	TRK, >16.5 TN 2P DMP /8YD	32309		5.0	48.90	245.
014-01-0140	TRK, >16.5 TN 3P DMP 8YD	32309		5.0	48.90	245.
014-04-0123	TRK, >16.5 TON LOWBOY TRC	35703		5.0	48.90	245.

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Example 3D Information (cont.)

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
HIGHWAY MAINTENANCE MANAGEMENT SYSTEM

Daily Work Report

Organization Unit	District	Date	Report No.
35703 D3 - FULL DEPTH PATCH	THREE	TUESDAY - JAN 29, 2019	13932594

Activity	Work Description	Work County	Asset Group
102 SURFACE REPAIRS	MAJOR LEVELING/STREN	GREENVILLE	

Asset	Special Event	Project Number
		453

Type	Route	Aux	Begin MP	End MP	Length	Direction	Position	Off System Description
I	85	00	43.00	45.00	2.00	S	ROADWAY	

Units of Accomplishment: 115.000 UOM:TONS Accident:N

	Labor	Equipment	Material	Total
Daily Cost:	3,544.	4,815.	7,928.	16,287.

Number		Description	Org/UOM	Quantity	Hours	Unit Cost	DWR Cost
Equipment							
014-04-0181		TRUCK, >16.5 TON 10 YD DU	32315		7.0	48.90	342.
021-13-0001		TRAILER, EQUIPMENT, TILTB	35703		5.0	14.15	71.
022-29-0017		TRAILER, HEAVY LOWBOY	35703		5.0	15.50	78.
025-38-0116		TRAILER UTILITY SIGN/BARR	35703		5.0	37.75	189.
026-04-0001		TRAILER, CARGO	35703		5.0	37.75	189.
053-08-0003		CENTERLINE MARKER SKID MN	35703		5.0	4.00	20.
054-08-0001		CENTERLINE MARKER, SELF P	35703		5.0	16.20	81.
073-02-0001		MILLING MACHINE, PAVEMENT	35703		5.0	135.00	675.
145-01-0008		PAVER, ASPHALT, CRAWLER	35703		5.0	203.65	1,018.
188-02-0054		SWEEPER, SELF-PROPELLED U	35703		5.0	76.70	384.
Material							
1005	DP	HFMS-2 ASPHALT LIQUID	GALS	60.00		3.62	217.
1023	DP	TYPE3 ASPHALT PLT MIX HOT	TONS	128.52		60.00	7,711.

DWR Comment:

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Example 4 Information

BANKS CONSTRUCTION
PO Box 71505
North Charleston, SC 29415
Phone: 843-744-8261
Fax: 843-747-8399

To:	SCDOT	**Contact:**	
Address:	Columbia, SC	**Phone:**	
		Fax:	
Project Name:	E14049 - I-526 OGFC Repair Patching	**Bid Number:**	E14049
Project Location:		**Bid Date:**	3/12/2014

Item #	Item Description	Estimated Quantity	Unit	Unit Price	Total Price
100010	MOBILIZATION	1.000	LS	$8,000.00	$8,000.00
100020	TRAFFIC CONTROL	1.000	LS	$12,000.00	$12,000.00
100030	VARIABLE MILLING	5,240.000	SY	$6.00	$31,440.00
100040	OGFC MIX	288.200	TON	$197.75	$56,991.55
100050	LIQUID ASPHALT PG 64-22	15.850	TON	$750.00	$11,887.50
100060	8" ASPHALT FULL DEPTH PATCH	160.000	SY	$139.75	$22,360.00
100070	6" SOLID YELLOW FAST DRY PAINT	1,000.000	LF	$0.33	$330.00
100080	6" SOLID WHITE FAST DRY PAINT	3,000.000	LF	$0.33	$990.00
100090	6" BROKEN WHITE FAST DRY PAINT	860.000	LF	$0.39	$335.40
100100	6" SOLID YELLOW THERMO	1,000.000	LF	$2.20	$2,200.00
100110	6" SOLID WHITE THERMO	3,000.000	LF	$2.20	$6,600.00
100120	6" BROKEN WHITE THERMO	860.000	LF	$2.31	$1,986.60
100130	CLEAR/RED RPM'S	45.000	EACH	$27.50	$1,237.50

Total Bid Price: $156,358.55

Notes:

- Price is good for 30 days.
- Due to the volatility in Liquid Asphalt Binder prices, we must index our pricing on this Project. The above proposal is calculated using the current March 1, 2014 SCDOT Basic Liquid Index Price of $573.18/ton (www.scdot.org/doing/monthlyindexes.asp). Variation to the Index Price at the time of asphalt placement will be determined and Banks Construction Company will adjust the price accordingly. Based on the above quantities, this project is estimated to require approximately xxx tons of Liquid Asphalt Binder
- This is a unit price bid based on provided quantities and scopes of work. Final payment will be based on field measurement. Changes in quantities and/or scopes of work are subject to re-pricing.
- We require 3 weeks notice to schedule paving.
- This Proposal is Subject to the execution of a non-modified 401 AIA contract and will be a part of contract as well. The subcontract agreement will be determined on credit evaluation.
- Price does not include any weekend work.
- Prior to any paving, a representative from Banks Construction Company will meet on site to verify existing site conditions.
- The submitted mix design must be approved and returned prior to paving.
- Banks Construction Company is an Equal Opportunity Employer, in full and complete compliance with applicable federal and state laws, including but not limited to the Immigration Reform and Control Act of 1986 as well as the South Carolina Immigration Reform Act of 2008.
- The contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate.

Payment Terms:

Payment due within 7 days after payment is made by owner or a maximum of 30 days from date of invoice.

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Example 5 Information

Rpt-ID: RCOCORPT | SOUTH CAROLINA | Date: 02/02/2019

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Change Order Report

Contract ID: 08.040656R1

Change Order Nbr: 002 **Force Acct ID:** 0

Change Order Type: Extension

CO Description: adding 0.18 miles of I-26 EB at Ashley Phosphate

Zero Dollar Change Order: No

Project Nbr	Itm Nbr	Catg	Item Code	Unit	Unit Price	Bid Qty	Prev Apprvd Qty	Curr CO Qty	Curr Apprvd Qty	Amount of Change
040656MT01R1	0015	0001	1031000	LS	$2,500.00	0	0	1	1	This Chng: $2,500.00
										Prev Revised: $0.00
Item Description MOBILIZATION					**CO Item Description**					New Revised: $2,500.00
Supplemental Description1										Bid Contract: $0.00
Supplemental Description2										Net Change: $2,500.00
										Pct Change: 0.
040656MT01R1	0035	0001	9800100	LS	$3,000.00	0	0	1	1	This Chng: $3,000.00
										Prev Revised: $0.00
Item Description CHANGE ORDER ITEM					**CO Item Description** Traffic Control Special for extension					New Revised: $3,000.00
Supplemental Description1										Bid Contract: $0.00
Supplemental Description2										Net Change: $3,000.00
										Pct Change: 0.
040656MT01R1	0060	0001	3069900	TON	$24.00	8	8	15	23	This Chng: $360.00
										Prev Revised: $192.00
Item Description MAINTENANCE STONE					**CO Item Description**					New Revised: $552.00
Supplemental Description1										Bid Contract: $192.00
Supplemental Description2										Net Change: $360.00
										Pct Change: 187.5
040656MT01R1	0080	0001	4011008	TON	$900.00	2060	1863.608	5.8	1869.408	This Chng: $5,220.00
										Prev Revised: $1,677,247.20
Item Description LIQUID ASPHALT BINDER PG76-22					**CO Item Description**					New Revised: $1,682,467.20
Supplemental Description1										Bid Contract: $1,854,000.00
Supplemental Description2										Net Change: $-171,532.80
										Pct Change: -9.25

Example 5 Information (cont.)

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Project Nbr	Itm Nbr	Catg	Item Code	Unit	Unit Price	Bid Qty	Prev Apprvd Qty	Curr CO Qty	Curr Apprvd Qty	Amount of Change
040656MT01R1	0100	0001	4013099	SY	$1.25	407224	408833.72	1387	410220.72	This Chng: $1,733.75
										Prev Revised: $511,042.15
Item Description SURFACE PLANE ASPHALT PAVEMENT - VARIABLE					CO Item Description					New Revised: $512,775.90
Supplemental Description1										Bid Contract: $509,030.00
Supplemental Description2										Net Change: $3,745.90
										Pct Change: 0.74
040656MT01R1	0105	0001	4012100	SY	$78.50	0	198	784	982	This Chng: $61,544.00
										Prev Revised: $15,543.00
Item Description FULL DEP.ASPH.PAV.PATCH-10"					CO Item Description					New Revised: $77,087.00
Supplemental Description1										Bid Contract: $0.00
Supplemental Description2										Net Change: $77,087.00
										Pct Change: 0.
040656MT01R1	0160	0001	4092000	TON	$60.00	30085	30085	87	30172	This Chng: $5,220.00
										Prev Revised: $1,805,100.00
Item Description OPEN-GRADED FRICTION COURSE					CO Item Description					New Revised: $1,810,320.00
Supplemental Description1										Bid Contract: $1,805,100.00
Supplemental Description2										Net Change: $5,220.00
										Pct Change: 0.29
040656MT01R1	0190	0001	6250007	LF	$0.07	79403	113030	200	113230	This Chng: $14.00
										Prev Revised: $7,912.10
Item Description 6" WHITE BROKEN LINES -(GAPS EXCLUDED)-FAST DRY PAINT					CO Item Description					New Revised: $7,926.10
Supplemental Description1										Bid Contract: $5,558.21
Supplemental Description2										Net Change: $2,367.89
										Pct Change: 42.6
040656MT01R1	0200	0001	6250012	LF	$0.08	334575	334575	980	335555	This Chng: $78.40
										Prev Revised: $26,766.00
Item Description 6" WHITE SOLID LINES (PVT. EDGE LINES)-FAST DRY PAINT					CO Item Description					New Revised: $26,844.40
Supplemental Description1										Bid Contract: $26,766.00
Supplemental Description2										Net Change: $78.40
										Pct Change: 0.29
040656MT01R1	0260	0001	6271007	LF	$0.58	35290	34620	200	34820	This Chng: $116.00
										Prev Revised: $20,079.60
Item Description 6" WHITE BROKEN LINES(GAPS EXCL.)THERMOPLASTIC-90 MIL					CO Item Description					New Revised: $20,195.60
Supplemental Description1										Bid Contract: $20,468.20
Supplemental Description2										Net Change: $-272.60
										Pct Change: -1.33

Example 5 Information (cont.)

Rpt-ID: RCOCORPT | SOUTH CAROLINA | Date: 02/02/2019

User: johnstcj | Department of Transportation | Page: 3 of 3

Project Nbr	Itm Nbr	Catg	Item Code	Unit	Unit Price	Bid Qty	Prev Apprvd Qty	Curr CO Qty	Curr Apprvd Qty	Amount of Change
040656MT01R1	0270	0001	6271012	LF	$0.56	148700	148700	980	149680	This Chng: $548.80
										Prev Revised: $83,272.00
Item Description 6" WHITE SOLID LINES (PVT. EDGE LINES) THERMO.- 90 MIL					CO Item Description					New Revised: $83,820.80
Supplemental Description1										Bid Contract: $83,272.00
Supplemental Description2										Net Change: $548.80
										Pct Change: 0.66
040656MT01R1	0280	0001	6271020	LF	$2.50	1900	2097	180	2277	This Chng: $450.00
										Prev Revised: $5,242.50
Item Description 12" WHITE SOLID LINES - THERMO. - 125 MIL.					CO Item Description					New Revised: $5,692.50
Supplemental Description1										Bid Contract: $4,750.00
Supplemental Description2										Net Change: $942.50
										Pct Change: 19.84
040656MT01R1	0325	0001	6300005	EA	$3.95	0	-6	6	0	This Chng: $23.70
										Prev Revised: $-23.70
Item Description PERM.CLR PAV.MARK MONO. 4"X 4"					CO Item Description					New Revised: $0.00
Supplemental Description1										Bid Contract: $0.00
Supplemental Description2										Net Change: $0.00
										Pct Change: 0.
040656MT01R1	0330	0001	6302001	EA	$3.95	2081	2081	10	2091	This Chng: $39.50
										Prev Revised: $8,219.95
Item Description PERM.RED/CLEAR PAVEMENT MARKERS BI-DIR. - 4"X 4"					CO Item Description					New Revised: $8,259.45
Supplemental Description1										Bid Contract: $8,219.95
Supplemental Description2										Net Change: $39.50
										Pct Change: 0.48

Total Value for Change Order 002 = $80,848.15

General or Standard Change Order Explanation

The purpose of this change order is to add an extension to this contract to include emergency repair work further up I-26 in Charleston County. We are adding 0.18 mile to this contract to repair to sections on I-26 at about the Ashley Phosphate exit in which the pavement is severely failing. The sections in question are MP208.2 - MP208.35I26 EB and I-26 Exit Ramp 209 MP 208 - MP 208.03. This work has been approved through a letter dated 8/24/12 from John V. Walsh, PE, Deputy Secretary for Engineering.

This change order will increase the contract amount by $ 84, 848.15. Upon approval of this change order the revised contract amount will be $6,797,659.12 which is a 1.20% overrun of the original contract amount.

Contractor's Signature: _____

Example 6 A & 6B Information

Lynches River Contracting, Inc.

P.O. Box 250
Pageland, SC 29728

Phone: 843-675-4285
Fax: 888-793-3382

To:	SCDOT	**Contact:**	Jason Johnston
Address:	Columbia, SC	**Phone:**	
		Fax:	
Project Name:	Interstate Repair Budget Quote	**Bid Number:**	TP011018
Project Location:	I-77, York County, SC	**Bid Date:**	1/10/2019

Line #	Item #	Item Description	Estimated Quantity	Unit	Unit Price	Total Price
OGFC Repair						
2	1031000	MOBILIZATION	1.00	LS	$17,500.00	$17,500.00
4	1032010	BONDS AND INSURANCE	1.00	LS	$500.00	$500.00
6	1071000	TRAFFIC CONTROL	1.00	LS	$2,500.00	$2,500.00
8	4011008	LIQUID ASPHALT BINDER PG76-22	25.00	TON	$1,000.00	$25,000.00
10	4013100	MILL. EXIST. ASPH. PVMT. 1.0"	355.00	SY	$20.00	$7,100.00
12	4092000	OPEN-GRADED FRICTION COURSE	20.00	TON	$420.00	$8,400.00
			Total Price for above OGFC Repair Items:			**$61,000.00**
Surface E Repair						
1	1031000	MOBILIZATION	1.00	LS	$15,000.00	$15,000.00
3	1032010	BONDS AND INSURANCE	1.00	LS	$500.00	$500.00
5	1071000	TRAFFIC CONTROL	1.00	LS	$2,500.00	$2,500.00
7	4011004	LIQUID ASPHALT BINDER PG64-22	1.26	TON	$750.00	$945.00
9	4013100	MILL. EXIST. ASPH. PVMT. 1.0"	355.00	SY	$20.00	$7,100.00
11	4030360	H/M ASPH.SURF.CR. TYPE E	20.00	TON	$350.00	$7,000.00
			Total Price for above Surface E Repair Items:			**$33,045.00**

Notes:

- Our price includes one mobilization for all work. Any additional mobilization required will be charged at $10,000.00/each.
- Project to be measured upon completion for determination of final pay quantities.
- We thank you for the opportunity of quoting this project. Should you have any questions or comments, please call Thad Preslar.

Payment Terms:

Monthly progress billings through 30th, due in full by 10th of following month.

ACCEPTED: The above prices, specifications and conditions are satisfactory and are hereby accepted.	**CONFIRMED:** **Lynches River Contracting, Inc.**
Buyer: _____	
Signature: _____	**Authorized Signature:** _____
Date of Acceptance: _____	**Estimator:** Thad Preslar (704) 634-0232 thad.preslar@lynchesrivercontracting.com

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Various Notes and Disclaimers

For a copy of the Google Earth KMZ file, please email JohnstonCJ@scdot.org.

Some Google Earth imagery is out-of-date or unclear. For this reason, many failure locations are not visible from the aerial or street view.

Since conventional surveying methods were not practical, the GPS coordinates were obtained in a vehicle traveling at highway speeds. Due to the processing time between when the button was pushed on the GPS equipment and the actual time that the coordinates were recorded, it was common to have GPS coordinates 150' past the actual issue on the pavement. To compensate, the points saved in the Google Earth KMZ file were manually moved to most accurately designate the area observed in the field. There are locations that were observed and surveyed that cannot be clearly viewed on Google Earth.

Shots were taken where OGFC was beginning to show signs of stone loss. These areas will be more visible as more current Google Earth imagery becomes available.

Projects that were completed in 2018 were not evaluated since remaining items on the punch list may not have been completed.

Existing segments of interstates that have apparent issues below the OGFC were not included. To protect the integrity of the data set, the entire contract was omitted from this research.

Some segments of OGFC interstates have since been patched to address raveling OGFC. Data was not collected specific to the number of patching locations or the apparent type of failure that was corrected. If these areas were factored in to this research project, the failure rates would be greater.

GPS coordinates were not obtained in areas where it was apparent damage was the result of a traffic accident, chemical spill, fire, damage from snow removal equipment, or reflective cracking from underlying concrete.

Though OGFC is place on interstate ramps as well as the mainline, data was not collected on the ramps and not included in this research. Many issues with ramp tie-ins were observed while traveling on the mainline of the interstates.

Projects completed prior to 2009 were not included in this research since the service live of OGFC is 10 years. There were not any projects found with completion dates in 2009. Either funding was not available during that time for OGFC or the segments of interstate have since been repaved.

The Substantial Work Complete dates for projects were used to determine the age of the existing OGFC. With pavement markings and rumble strips, the OGFC was likely completed earlier.

There were three primary people that assisted in data collection and GPS mapping and they are due special thanks. They are Timothy T. Bowers, Raymond B. Cheek and William C. Lindsey, all from the SCDOT District 4 Engineering Office.